

5

VOLUME IV

DOCUMENT NUMBER

QTR-2191-001

REV. N/C

TITLE

QUALIFICATION TEST REPORT FOR  
450 GALLON CRASHWORTHY FUEL TANK  
FOR

U.S. AIR FORCE H-53 HELICOPTER

TEST PERFORMED BY

FIBER SCIENCE DIVISION

CONTRACT NUMBER

F09603-79-C-1642-P20002

PREPARED BY

RICHARD R. LYMAN

C.A. PATNODE, JR.

JAMES O. CRUMBAKER

APRIL 2, 1982

FIBER SCIENCE DIVISION

SALT LAKE CITY, UTAH 84116

PREPARED FOR

WARNER ROBINS ALC/MMSRCB

ROBINS AIR FORCE BASE, GEORGIA 31098

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APPENDIX B  
QUALIFICATION TEST REPORTS

QTR-2191

SECTION A THRU H  
J THRU L

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NO. QTR-2191

DATE: 4/6/82

PAGE

OF

APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION A  
INSPECTION TEST DATA SHEETS  
S/N 0002



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OF



# INSPECTION TEST DATA SHEET

QTR-2191 SECTION "A"

Inspector: FIBER SCIENCE Activity Quality Engr. J.K. GEORGE  
Tank Serial N 0002 F.S.I. Test Engr. R. LYMAN  
Inspection Date 4/11/81 Government Rep. W. AMES

## INSPECTION EQUIPMENT REVIEW

Ref. Para. 4.1

List of inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. <u>12" CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>JULY 27, 80</u>
2. <u>0-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>AUG. 2, 80</u>
3. <u>12-36" PI TAP</u>	<u>GOOD</u>	<u>YES</u>	<u>MAR. 2, 81</u>
4. <u>INDICATOR, DIAL</u>	<u>GOOD</u>	<u>YES</u>	<u>SEPT. 5, 80</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____



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INDIVIDUAL INSPECTION

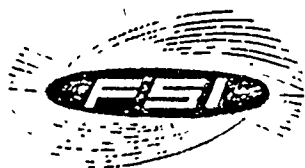
Ref. Para. 4.2: Individual Inspections performed

By J. George / S. Peterson -- 10 APR 81

INTERNAL CLEANLINESS INSPECTION

Ref. Para 4.2.1: LINT-FREE CLOTH WIPE INSPECTION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
Liner	<u>ACCEPT</u>	<u>(S)</u>
Frames	<u>ACCEPT</u>	
Tubing	<u>ACCEPT</u>	<u>(S)</u>
Bellmouth	<u>ACCEPT</u>	
Others:	<u>ACCEPT</u>	
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



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### INSPECT LINER FOR LEAKAGE

Ref. Para 4.2.2: LINE - ROOF PRESSURE

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
2.0 ± .10 ps.		
Soap Bubble Test		
Leaks (If any)		

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
1. _____		
2. _____		
3. _____		
4. _____		

### LINER DIAMETER INSPECTION

Ref. Para. 4.2.3: LINER MEASURED TO THE REQUIREMENTS OF FIGURE 1

<u>LOCATION</u>	<u>DIAMETER</u>	<u>INSPECTION STAMP</u>
A. _____		
B. _____		
C. _____		
D. _____		

### COMPOSITE CONSTRUCTION INSPECTION

Ref. Para. 4. Composite Construction Inspection performed

By M. GIMMERS Date 16 Apr 81



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FILAMENT WINDING EQUIPMENT

Ref. Para. 4.2

SUBJECT EQUIPMENT CAPABILITIES

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Circumferential Capabilities _____		
Helical Capabilities _____		
Machine Program _____		

ROVING DEGRATION

Ref. Para. 4.2.4.2:

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Fiber Creel _____		
Resin Bath _____		
Spreader Bar _____		
Winding Eye _____		
Guide Eyes (If Applicable) _____		
Direction Control Bars (If Applicable) _____		

ROVING GAP

Ref. Para. 4.2.4.3: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. <u>NONE</u> _____	<u>ACCEPT</u> _____	
2. _____	_____	
3. _____	_____	
4. _____	_____	



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ROVING BRIDGING

Ref. Para. 4.2.4:

SHALL NOT EXCEED .50 INCHES BY 12.00 INCHES

	<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1.	<u>NONE</u>	<u>ACCEPT</u>	<u>(Stamp)</u>
2.	<u>                    </u>	<u>                    </u>	<u>                    </u>
3.	<u>                    </u>	<u>                    </u>	<u>                    </u>
4.	<u>                    </u>	<u>                    </u>	<u>                    </u>

ROVING SLIPPAGE

Ref. Para. 4.2.4.5:

SHALL NOT EXCEED .25 INCHES

	<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1.	<u>NONE</u>	<u>ACCEPT</u>	<u>(Stamp)</u>
2.	<u>                    </u>	<u>                    </u>	<u>                    </u>
3.	<u>                    </u>	<u>                    </u>	<u>                    </u>
4.	<u>                    </u>	<u>                    </u>	<u>                    </u>

ROVING KNOTS

Ref. Para. 4.2.4.6:

SHALL NOT EXIST WITHOUT REMOVAL

	<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1.	<u>NONE</u>	<u>ACCEPT</u>	<u>                    </u>
2.	<u>                    </u>	<u>                    </u>	<u>                    </u>
3.	<u>                    </u>	<u>                    </u>	<u>                    </u>
4.	<u>                    </u>	<u>                    </u>	<u>                    </u>



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ROVING RESIN CONTROL

Ref. Para. 4.2.4 7.

COMPLETE INPREGNATION

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

INSPECTION STAMP: \_\_\_\_\_

UNIFORM COMPOSITE CONSTRUCTION

Ref. Para. 4.2.4.8:

VERIFY MANUFACTURING PROCESS IN COMPLIANCE WITH  
ENGINEERING REQUIREMENTS, INCLUDING WEIGHT

ITEM

REMARKS

INSP.  
STAMP

Liner Weight \_\_\_\_\_

Manufacturing \_\_\_\_\_

Process Compliance \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Cured Assembly Weight \_\_\_\_\_

COMPOSITE CONSTRUCTION TESTING

Ref. Para. 4.2.5:

Composite Construction Testing performed

By B. Adamson Date \_\_\_\_\_



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COMPOSITE SANDWICH CORE

REF: Para 4.2.5.3

Verify 25°      ive strength.

NOTE: Either a or b must comply.

a. ified ven. test.

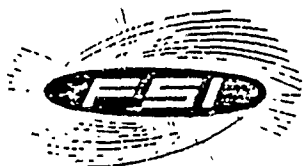
Remarks: FSI PC, #200, JCB L242/46

438 PSI @ 4.2 PSI

MIL-C-81486 REVEL (S) 1/2-6 SC.

b. Lab test of 5 samples from each batch or lot each from a different sheet in the batch.

<u>Item</u>	<u>Tested Compressive Strength</u>
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____



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### RESIN CONTENT

REF: Para 4.2.5.1

Verify \_\_\_\_\_ of approximately 50 feet  
\_\_\_\_\_ roving. Shall be  $50\% \pm 5\%$  by  
\_\_\_\_\_ volume.

<u>TYPE</u>	<u>LENGTH</u>	<u>WEIGHT</u>
Dry S-2 Glass Roving	_____	_____
Impregnated Roving	_____	_____

Calculated Resin Content \_\_\_\_\_

Remarks: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### LAP SHEAR TESTING

REF: Para. 4.2.5.2

Prepare Lap Shear per Figure 3.

NOTE: Test method per ASTM-D-1002 method 64 (minimum value 200 psi)

<u>SAMPLE</u>	<u>CURE TEMP.</u>	<u>CURE TIME</u>	<u>TEST VALUE</u>
1	275 F	4 HR	1272 PSI
2	/	/	1242 PSI
3	/	/	1126 PSI
4	/	/	1042 PSI
5	/	/	1126 PSI
6	/	/	_____



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### STRUCTURAL COMPOSITE CURING

REF: Para 4.2.5.4

Verify proper cure of \_\_\_\_\_ design requirements.

#### CURING TEMPERATURE

##### Design Requirements

##### Actual Values

Stage 1 \_\_\_\_\_

\_\_\_\_\_

Stage 2 \_\_\_\_\_

\_\_\_\_\_

Stage 3 \_\_\_\_\_

\_\_\_\_\_

Stage 4 \_\_\_\_\_

\_\_\_\_\_

#### TIME AT TEMPERATURE

##### Design Requirements

##### Actual Values

Stage 1 \_\_\_\_\_

\_\_\_\_\_

Stage 2 \_\_\_\_\_

\_\_\_\_\_

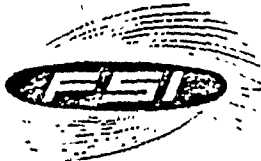
Stage 3 \_\_\_\_\_

\_\_\_\_\_

Stage 4 \_\_\_\_\_

\_\_\_\_\_

NOTE: If temperature recorder was used, attach a copy of recorder sheet.



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EVALUATION OF DATA

TANK LINER FABRICATION: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FILAMENT WINDING OF TANK: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TANK COMPOSITE CURING: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXAMINATION OF CURED: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION A  
INSPECTION TEST DATA SHEETS  
S/N 0003



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SALT LAKE CITY, UTAH

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OF

# INSPECTION TEST DATA SHEET

QTR-2191 SECTION "A"

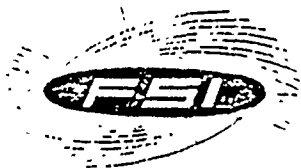
Inspection Activity FIBER SCIENCE Acti... J. George  
 Tank Serial No. 0003 F.S.I. st P. Lynch  
 Inspection Date 4-15-81 Government Rep. W. Ames

## INSPECTION EQUIPMENT REVIEW

Ref. Para. 4.1

List of inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

ITEM	WORKING CONDITION	REGULARLY CALIBRATED	LAST CALIBRATION DATE
1. <u>12" CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>JULY 27, 80</u>
2. <u>0-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>AUG 16, 80</u>
3. <u>12-36" PI TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>AUG 2, 80</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____



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INDIVIDUAL INSPECTION

Ref. Para. 4.2: Individual Inspections performed

S. PETERSON, M. CHAMBERS Date 1-23-81

INTERNAL CLEANLINESS INSPECTION

Ref. Para 4.2.1: LINT-FREE CLOTH WIPE INSPECTION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
Liner	<u>NONE</u>	<u>[initials]</u>
Frames	<u>[initials]</u>	<u>[initials]</u>
Tubing	<u>[initials]</u>	<u>[initials]</u>
Bellmouth	<u>[initials]</u>	<u>[initials]</u>
Others:	<u>[initials]</u>	<u>[initials]</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



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INSPECT LINER FOR LEAKAGE

Ref. Para 4.2.2: LINER PROOF PP

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
2.0 ± .25 psi	<u>ACCEPT</u>	
Soap Bubble Test		
Leaks (If any)		

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

LINER DIAMETER INSPECTION

Ref. Para. 4.2.3: LINER MEASURED TO THE REQUIREMENTS OF FIGURE 1

<u>LOCATION</u>	<u>DIAMETER</u>	<u>INSPECTION STAMP</u>
A. _____	<u>28.500</u>	<u>✓</u>
B. _____	<u>28.500</u>	
C. _____	<u>28.465</u>	
D. _____	<u>28.572</u>	<u>✓</u>

CONTINUE TO PROCESS.

COMPOSITE CONSTRUCTION INSPECTION

Ref. Par 4.2.4: Composite Construction Inspection performed

By J George Date 4/14/81



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
NO. QTP-2191 Section "A"

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FILAMENT WINDING EQUIPMENT

... Para. 4.2.4.1: INSPECT EQUIPMENT CAPABILITIES

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
Circumferential Capabilities _____		
Helical Capabilities _____		
Machine Program _____		

ROVING DEGRATION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
Fiber Creel _____		
Resin Bath _____		
Spreader Bar _____		
Winding Eye _____		
Guide Eyes (If Applicable) _____		
Direction Control Bars (If Applicable) _____		

ROVING GAP

Ref. Para. 4.2.4.3: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<i>NONE</i>	
2. _____		
3. _____		
4. _____		



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
ROVING BRIDGING

4.2.4.4: SHALL NOT EXCEED .50 INCHES BY 12.00

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____


ROVING SLIPPAGE

Ref. Para. 4.2.4.5: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

ROVING KNOTS

Ref. Para. 4.2.4.6: SHALL NOT EXIST WITHOUT REMOVAL

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



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ROVING RESIN CONTROL

Para. 4.2.4.7: VERIFY COMPLETE INPREGNATION

REMARKS: Complete impregnation  
of winding through impregnator

INSPECTION STAMP: \_\_\_\_\_

UNIFORM COMPOSITE CONSTRUCTION

Ref. Para. 4.2.4.8: VERIFY MANUFACTURING PROCESS IN COMPLIANCE WITH  
ENGINEERING REQUIREMENTS, INCLUDING WEIGHT

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Liner Weight _____		
Manufacturing _____		
Process Compliance _____		
_____		
_____		
Cured Assembly Weight _____		

COMPOSITE CONSTRUCTION TESTING

Ref. Para. 4.2.5: Composite Construction Testing performed

By M. Cimmers Date \_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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### RESIN CONTENT

Para 4.2.5.1

Verify resin content of and  
of impregnated roving  
volume.

2.50 feet  
5% by

<u>ITEM</u>	<u>LENGTH</u>	<u>WEIGHT</u>
Dry S-2 Glass Roving	<u>50' 20'</u>	<u>65.0 26.5</u>
Impregnated Roving	<u>50' 20'</u>	<u>97.6 40.1</u>
Calculated Resin Content	<u>33.4%</u>	<u>41.5%</u>

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

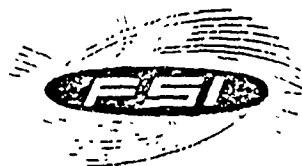
### LAP SHEAR TESTING

REF: Para. 4.2.5.2

Prepare Lap Shear per Figure 3.

NOTE: Test method per ASTM-D-1002 method 64 (minimum value 200 psi)

<u>SAMPLE</u>	<u>CURE TEMP.</u>	<u>CURE TIME</u>	<u>TEST VALUE</u>
1	<u>275° E</u>	<u>4 hrs</u>	<u>1272</u>
2	<u>          </u>	<u>1</u>	<u>1242</u>
3	<u>          </u>	<u>          </u>	<u>1126</u>
4	<u>          </u>	<u>          </u>	<u>1042</u>
5	<u>          </u>	<u>          </u>	<u>1126</u>
6	<u>          </u>	<u>          </u>	<u>          </u>



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COMPOSITE SANDWICH CORE

REF: Para 4.2

ify 250 psi compressive strength.

NOTE: Either a or b must comply.

a. Certified vendor test.

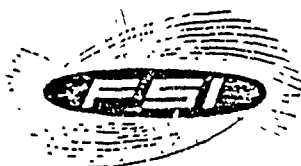
Remarks: FSI P.O. A 2631 Job L243946

438 PSI, 412 PSI

MIL-C-81986 HEXCEL 12-16-80

b. Lab test of 5 samples from each batch or lot  
each from a different sheet in the batch.

<u>Item</u>	<u>Tested Compressive Strength</u>
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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### STRUCTURAL COMPOSITE CURING

REF: Para 4.2 5.4

Verify proper cure cycle to design req.

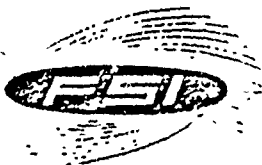
#### CURE TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>150 ± 20°F</u>	<u>150/155</u>
Stage 2 <u>225° ± 10°F</u>	<u>220/225</u>
Stage 3 <u>275° ± 10°F</u>	<u>265/270</u>
Stage 4 _____	_____

#### TIME AT TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>4 HRS</u>	<u>4 HRS 30'</u>
Stage 2 <u>4 HRS</u>	<u>4 HRS 15'</u>
Stage 3 <u>4 HRS</u>	<u>4 HRS 40'</u>
Stage 4 _____	_____

NOTE: If temperature recorder was used, attach a copy of recorder sheet.



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EVALUATION OF DATA

TANK LINER FABRICATION: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FILAMENT WINDING OF TANK: \_\_\_\_\_

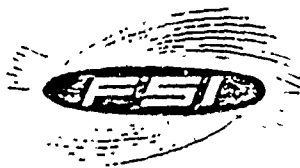
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TANK COMPOSITE CURING: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXAMINATION OF CURED: \_\_\_\_\_

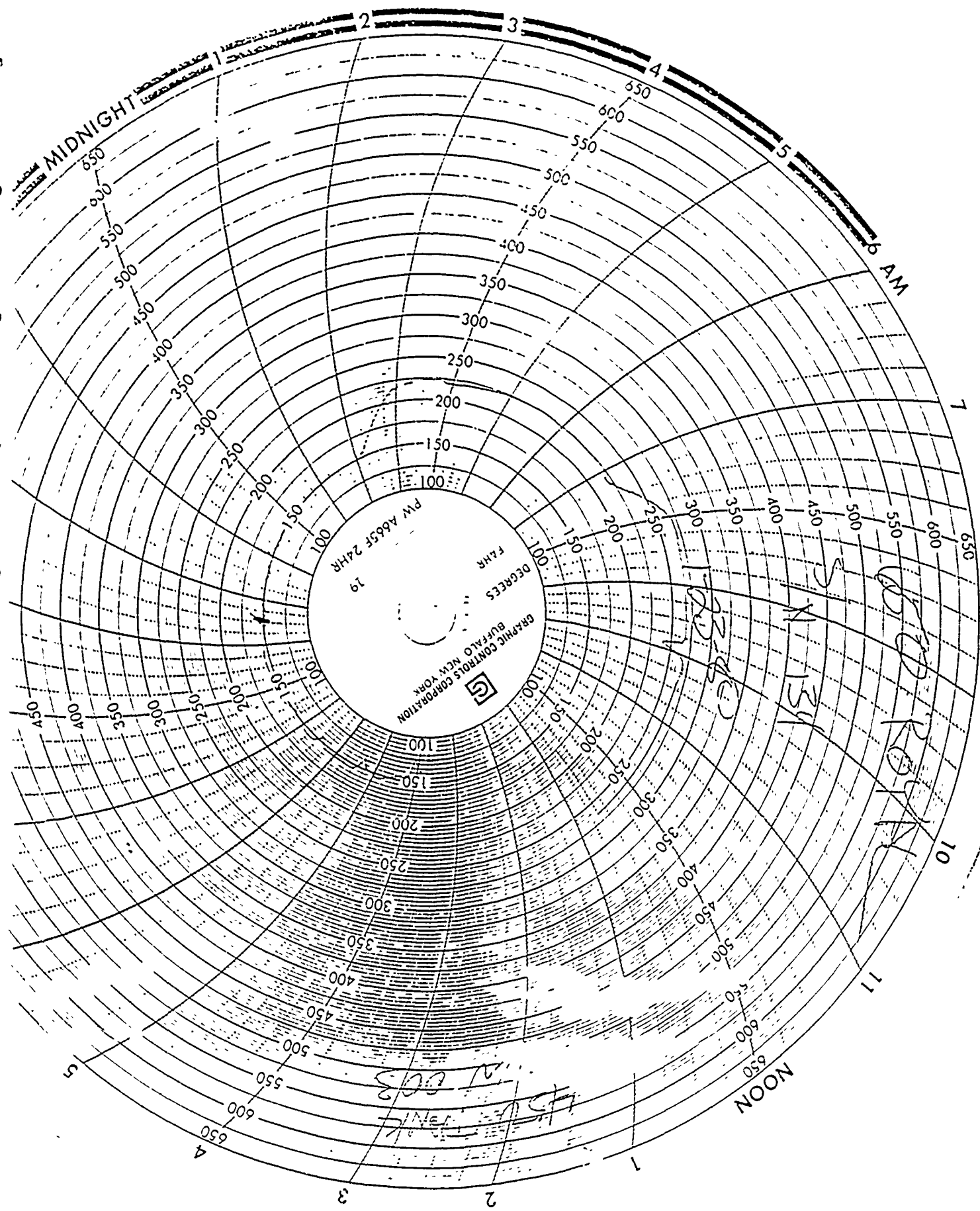
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION A  
INSPECTION TEST DATA SHEETS  
S/N 0004



**FIBER SCIENCE, INC.**  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

# INSPECTION TEST DATA SHEET

QTR-2191 SECTION "A"

Inspection Activity FIBER SCIENCE Activity Quality Engr. J.K. GEORGE  
 Tank Serial No. 0004 F.S.I. Test Engr. \_\_\_\_\_  
 Inspection Date 4/15/81 Government Rep. \_\_\_\_\_

## INSPECTION EQUIPMENT REVIEW

Ref. Para. 4.1 List of inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

ITEM	WORKING CONDITION	REGULARLY CALIBRATED	LAST CALIBRATION DATE
1. <u>12" CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>27 JULY 80</u>
2. <u>0-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>16 AUG 80</u>
3. <u>12-36" PITAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>2 AUG 80</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____



FIBER SCIENCE, INC.  
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
INDIVIDUAL INSPECTION

Ref. Para. 4.2: Individual Inspections performed

By J. George, D. Moser - Dat 4/13/81

INTERNAL CLEANLINESS INSPECTION

Ref. Para 4.2.1: LINT-FREE CLOTH WIPE INSPECTION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION</u> <u>-STAMP-</u>
Liner	<u>ACCEPTABLE</u>	
Frames	<u>ACCEPTABLE</u>	
Tubing	<u>ACCEPTABLE</u>	
Bellmouth	<u>ACCEPTABLE</u>	
Others:		
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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INSPECT LINER FOR LEAKAGE

Ref. Para. 4.2.2: LINER PROOF PRESSURE

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
2.0 ± .25 psi	<u>NONE</u>	<u>(Stamp)</u>
Soap Bubble Test	_____	_____
Leaks (If any)	_____	_____

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

LINER DIAMETER INSPECTION

Ref. Para. 4.2.3: LINER MEASURED TO THE REQUIREMENTS OF FIGURE 1

<u>LOCATION</u>	<u>DIAMETER</u>	<u>INSPECTION STAMP</u>
A. _____	<u>28.565</u>	<u>(Stamp)</u>
B. _____	<u>28.487</u>	_____
C. _____	<u>28.500</u>	_____
D. _____	<u>28.487</u>	_____

COMPOSITE CONSTRUCTION INSPECTION

Ref. Para. 4.2.4: Composite struction Inspection performed

By George Date 2-28'



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH


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FILAMENT WINDING EQUIPMENT

Ref. Para. 4.2.4.1: INSPECT CAPABILITIES


<u>ITEM</u>	<u>REMARKS</u>	<u>INS.</u> <u>STAMP</u>
Circumferential Capabilities _____		
Helical Capabilities _____		
Machine Program _____		

ROVING DEGRATION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Fiber Creel _____		
Resin Bath _____		
Spreader Bar _____		
Winding Eye _____		
Guide Eyes (If Applicable) _____		
Direction Control Bars (If Applicable) _____		

ROVING GAP

Ref. Para. 4.2.4.3: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. _____	<i>NONE</i>	
2. _____		
3. _____		
4. _____		



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH


NO. QTP-2191 Section "A"

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ROVING BRIDGING

Ref. Para. 4.2.4.4: SHALL NOT EXCEED .50 INCHES BY 12.00 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____


ROVING SLIPPAGE

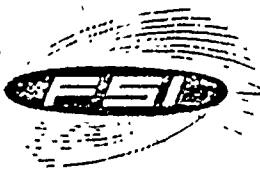
Ref. Para. 4.2.4.5: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

ROVING KNOTS

Ref. Para. 4.2.4.6: SHALL NOT EXIST WITHOUT REMOVAL

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. _____	<u>NONE</u>	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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ROVING RESIN CONTROL

Ref. Para. 4.2.4.7: VERIFY COMPLETION

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

INSPECTION STAMP: \_\_\_\_\_



UNIFORM COMPOSITE CONSTRUCTION

Ref. Para. 4.2.4.8: VERIFY MANUFACTURING PROCESS IN COMPLIANCE WITH ENGINEERING REQUIREMENTS, INCLUDING WEIGHT

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
Liner Weight	_____	
Manufacturing	_____	
Process Compliance	_____	
_____	_____	_____
_____	_____	_____
Cured Assembly Weight	_____	_____

COMPOSITE CONSTRUCTION TESTING

Ref. Para. 4.2.5: Composite Construction Testing performed

By J. George Date 2/3/81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

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### RESIN CONTENT

REF: Para 4.2.5

Verify resin content of approximately 50 feet  
impregnated roving. Shall be 50%  $\pm$  5% by  
volume.

	<u>LENGTH</u>	<u>WEIGHT</u>
Dry S-2 Glass Roving	<u>50'</u>	<u>59.3</u>
Impregnated Roving	<u>50'</u>	<u>86.2</u>

Calculated Resin Content 31.2%

Remarks: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### LAP SHEAR TESTING

REF: Para. 4.2.5.2

Prepare Lap Shear per Figure 3.

NOTE: Test method per ASTM-D-1002 method 64 (minimum value 200 psi)

<u>SAMPLE</u>	<u>CURE TEMP.</u>	<u>CURE TIME</u>	<u>TEST VALUE</u>
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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COMPOSITE SANDWICH CORE

Para 4.2.5.3

Verify 250 psi compressive

NOTE: Either a or b must comply.

a. Certified value test.

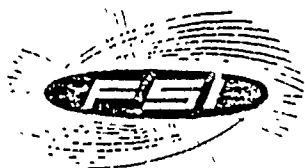
Remarks: FSI P.O. A2631 Job L242946

438 PSI, 412 PSI

ALL-C-81986 HEXCEL 12-16-80

b. Lab test of 5 samples from each batch or lot each from a different sheet in the batch.

<u>Item</u>	<u>Tested Compressive Strength</u>
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____



FIBER SCIENCE, INC.  
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### STRUCTURAL COMPOSITE CURING

REF: Para 4.2.5.4

Verify - ... cycle to design requirements.

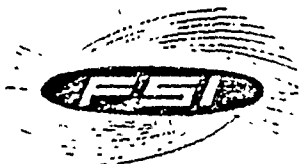
#### CURE TEMPERATURE

<u>Design Reqs.</u>	<u>Actual Values</u>
Stage 1 <u>150° ± 20°F</u>	<u>125 / 150</u>
Stage 2 <u>225° ± 10°F</u>	<u>200 / 225</u>
Stage 3 <u>275° ± 10°F</u>	<u>265</u>
Stage 4 _____	_____

#### TIME AT TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>4 hrs</u>	<u>5 hrs</u>
Stage 2 <u>4 hrs</u>	<u>4 hrs</u>
Stage 3 <u>4 hrs</u>	<u>4 hrs</u>
Stage 4 _____	_____

NOTE: If temperature recorder was used, attach a copy of recorder sheet.



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EVALUATION OF DATA

TANK LINER FABRICATION: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FILAMENT WINDING OF TANK: \_\_\_\_\_

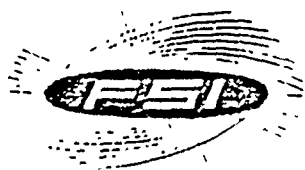
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TANK COMPOSITE CURING: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXAMINATION OF CURED: \_\_\_\_\_

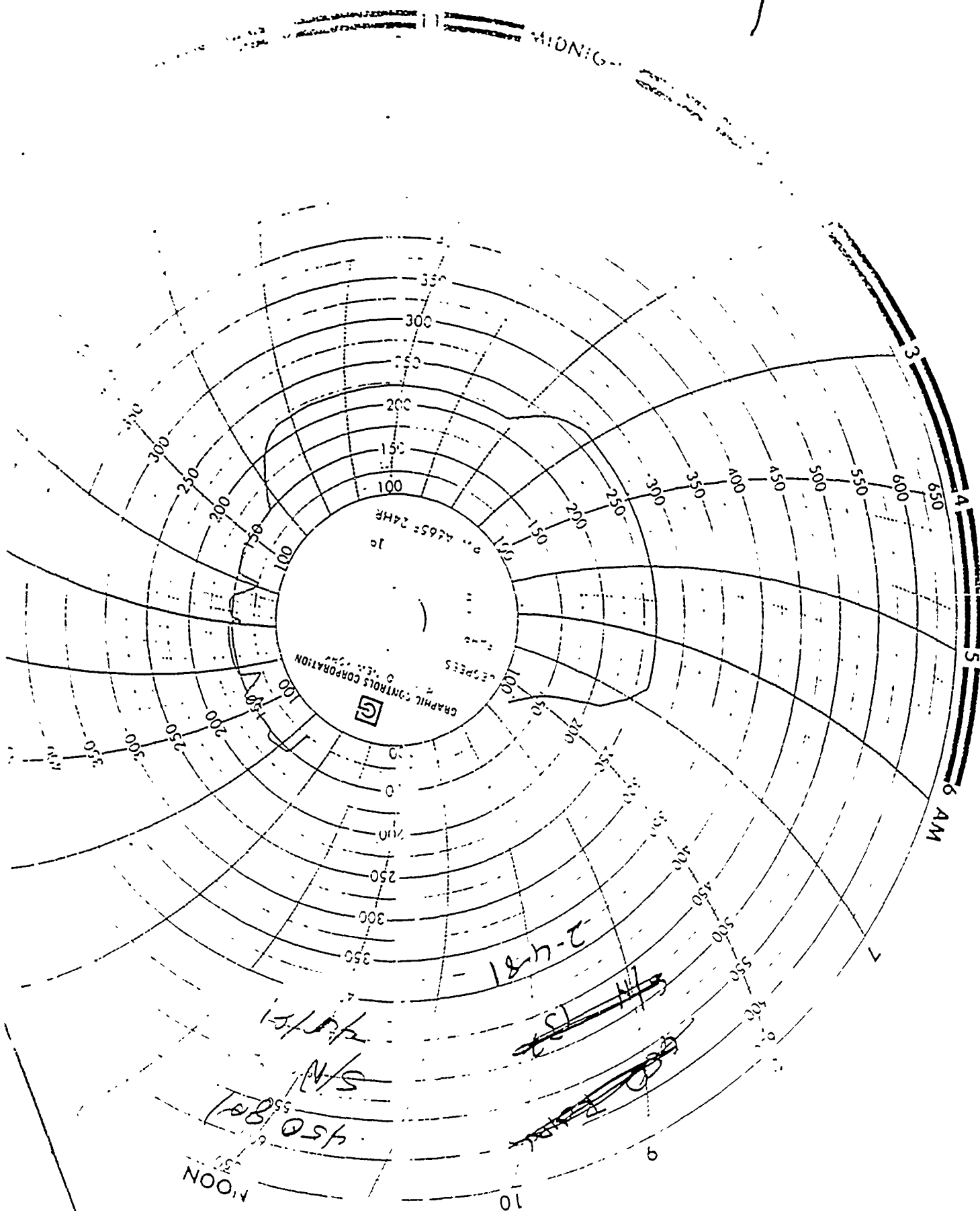
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION A  
INSPECTION TEST DATA SHEETS  
S/N 0005



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

# INSPECTION TEST DATA SHEET

QTR-2191 SECTION "A"

Inspection Activity FSI Activity Quality Engr. J.K. GEORGE  
 Tank Serial No. 005 F.S.I. Test Engr. \_\_\_\_\_  
 Inspection Date 2-18-81 Government Rep. \_\_\_\_\_

## INSPECTION EQUIPMENT REVIEW

Ref. Para. 4.1

List of inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

ITEM	WORKING CONDITION	REGULARLY CALIBRATED	LAST CALIBRATION DATE
1. <u>PI TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>JULY 2 1980</u>
2. <u>INDICATOR</u>	<u>GOOD</u>	<u>YES</u>	<u>SEPT 5 1980</u>
3. <u>PI TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>SEPT 27 1980</u>
4. <u>CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>SEPT 2 1980</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____



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SALT LAKE CITY, UTAH

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INDIVIDUAL INSPECTION

Ref. Para. 4.2: Individual Inspections performed

By J. George / D. Moser Date 2-3-81

INTERNAL CLEANLINESS INSPECTION

Ref. Para 4.2.1: LINT-FREE CLOTH WIPE INSPECTION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
Liner	<u>ACCEPT</u>	<u>(SP)</u>
Frames	<u>ACCEPT</u>	
Tubing	<u>ACCEPT</u>	
Bellmouth	<u>ACCEPT</u>	
Others:		
1. _____		
2. _____		
3. _____		
4. _____		



FIBER SCIENCE, INC.  
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INSPECT LINER FOR LEAKAGE

Ref. Para 4.2.2: LINER PROOF PRESSURE

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
2.0 ± .25 psi	<u>ACCEPTABLE</u>	<u>(INSP 20)</u>
Soap Bubble Test	_____	_____
Leaks (If any)	<u>NONE</u>	_____
<u>LOCATION</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

LINER DIAMETER INSPECTION

Ref. Para. 4.2.3: LINER MEASURED TO THE REQUIREMENTS OF FIGURE 1

<u>LOCATION</u>	<u>DIAMETER</u>	<u>INSPECTION STAMP</u>
A.	<u>28.519</u>	<u>(INSP 20)</u>
B.	<u>28.500</u>	_____
C.	<u>28.519</u>	_____
D.	<u>28.464</u>	_____

COMPOSITE CONSTRUCTION INSPECTION

Ref. Para. 4.2.4: Composite Construction Inspection performed

By J. Gecige Date 2-18-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH


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FILAMENT WINDING EQUIPMENT

Ref. Para. 4.2.4.1: INSPECT EQUIPMENT CAPABILITIES

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Circumferential Capabilities	<u>ACCEPTABLE</u>	
Helical Capabilities	<u>ACCEPTABLE</u>	
Machine Program	<u>ACCEPTABLE</u>	


ROVING DEGRATION

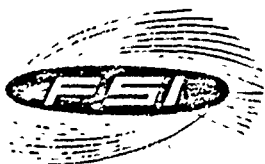
Ref. Para. 4.2.4.2:

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Fiber Creel	<u>ACCEPTABLE</u>	
Resin Bath	<u>"</u>	
Spreader Bar	<u>"</u>	
Winding Eye	<u>"</u>	
Guide Eyes (If Applicable)	<u>"</u>	
Direction Control Bars (If Applicable)		

ROVING GAP

Ref. Para. 4.2.4.3: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. <u>none</u>		
2. _____		
3. _____		
4. _____		



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SALT LAKE CITY, UTAH

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ROVING BRIDGING

Ref. Para. 4.2.4.4: SHALL NOT EXCEED .50 INCHES BY 12.00 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. <u>NONE</u>		
2. _____		
3. _____		
4. _____		

ROVING SLIPPAGE

Ref. Para. 4.2.4.5: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. <u>NONE</u>		
2. _____		
3. _____		
4. _____		

ROVING KNOTS

Ref. Para. 4.2.4.6: SHALL NOT EXIST WITHOUT REMOVAL

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
1. <u>NONE</u>		
2. _____		
3. _____		
4. _____		



FIBER SCIENCE, INC.  
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ROVING RESIN CONTROL

Ref. Para. 4.2.4.7: VERIFY COMPLETE INPREGNATION

REMARKS: ACCEPTABLE

INSPECTION STAMP: \_\_\_\_\_



UNIFORM COMPOSITE CONSTRUCTION

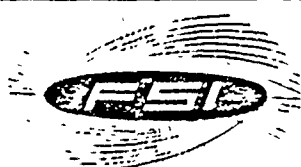
Ref. Para. 4.2.4.8: VERIFY MANUFACTURING PROCESS IN COMPLIANCE WITH  
ENGINEERING REQUIREMENTS, INCLUDING WEIGHT

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP. STAMP</u>
Liner Weight	<u>53.6</u>	
Manufacturing	<u>105.5</u>	
Process Compliance		
Cured Assembly Weight	<u>227.8</u>	

COMPOSITE CONSTRUCTION TESTING

Ref. Para. 4.2.5: Composite Construction Testing performed

By R. Anderson Date 9-10-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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### RESIN CONTENT

REF: Para 4.2.5.1

Verify resin content of approximately 50 feet of impregnated roving. Shall be 50%  $\pm$  5% by volume.

<u>ITEM</u>	<u>LENGTH</u>	<u>WEIGHT</u>
Dry S-2 Glass Roving	<u>30'</u>	<u>60.0</u>
Impregnated Roving	<u>20'</u>	<u>83.5</u>
Calculated Resin Content	<u>28.1%</u>	<u>(FS INCH)</u>

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### LAP SHEAR TESTING

REF: Para. 4.2.5.2

Prepare Lap Shear per Figure 3.

NOTE: Test method per ASTM-D-1002 method 64 (minimum value 200 psi)

<u>SAMPLE</u>	<u>CURE TEMP.</u>	<u>CURE TIME</u>	<u>TEST VALUE</u>
1	<u>27.5° F</u>	<u>4 HRS</u>	<u>272 PSI</u>
2			<u>1242 PSI</u>
3			<u>1120 PSI</u>
4			<u>1242 PSI</u>
5			<u>1126 PSI</u>
6			



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COMPOSITE SANDWICH CORE

REF: Para 4.2.5.3

Verify 250 psi compressive strength.

NOTE: Either a or b must comply.

a. Certified vendor test.

Remarks: FSI RD. A 2631 JCB L2412946

438 PSI, 412 PSI

MIL-C-81986 NEXCEL 12-16-80



b. Lab test of 5 samples from each batch or lot each from a different sheet in the batch.

<u>Item</u>	<u>Tested Compressive Strength</u>
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

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### STRUCTURAL COMPOSITE CURING

REF: Para 4.2.5.4

Verify proper cure cycle to design requirements.

#### CURE TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>150° ± 20°F</u>	<u>125 - 150°</u>
Stage 2 <u>225° ± 10°F</u>	<u>220 - 225°</u>
Stage 3 <u>275° ± 10°F</u>	<u>265°</u>
Stage 4 _____	_____

FS  
INSP  
52

#### TIME AT TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>4 HRS</u>	<u>4 HRS</u>
Stage 2 <u>4 HRS</u>	<u>4 HRS</u>
Stage 3 <u>4 HRS</u>	<u>4 HRS</u>
Stage 4 _____	_____

FS  
INSP  
52

NOTE: If temperature recorder was used, attach a copy of recorder sheet.



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SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

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EVALUATION OF DATA

TANK LINER FABRICATION: \_\_\_\_\_

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FILAMENT WINDING OF TANK: \_\_\_\_\_

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TANK COMPOSITE CURING: \_\_\_\_\_

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EXAMINATION OF CURED: \_\_\_\_\_

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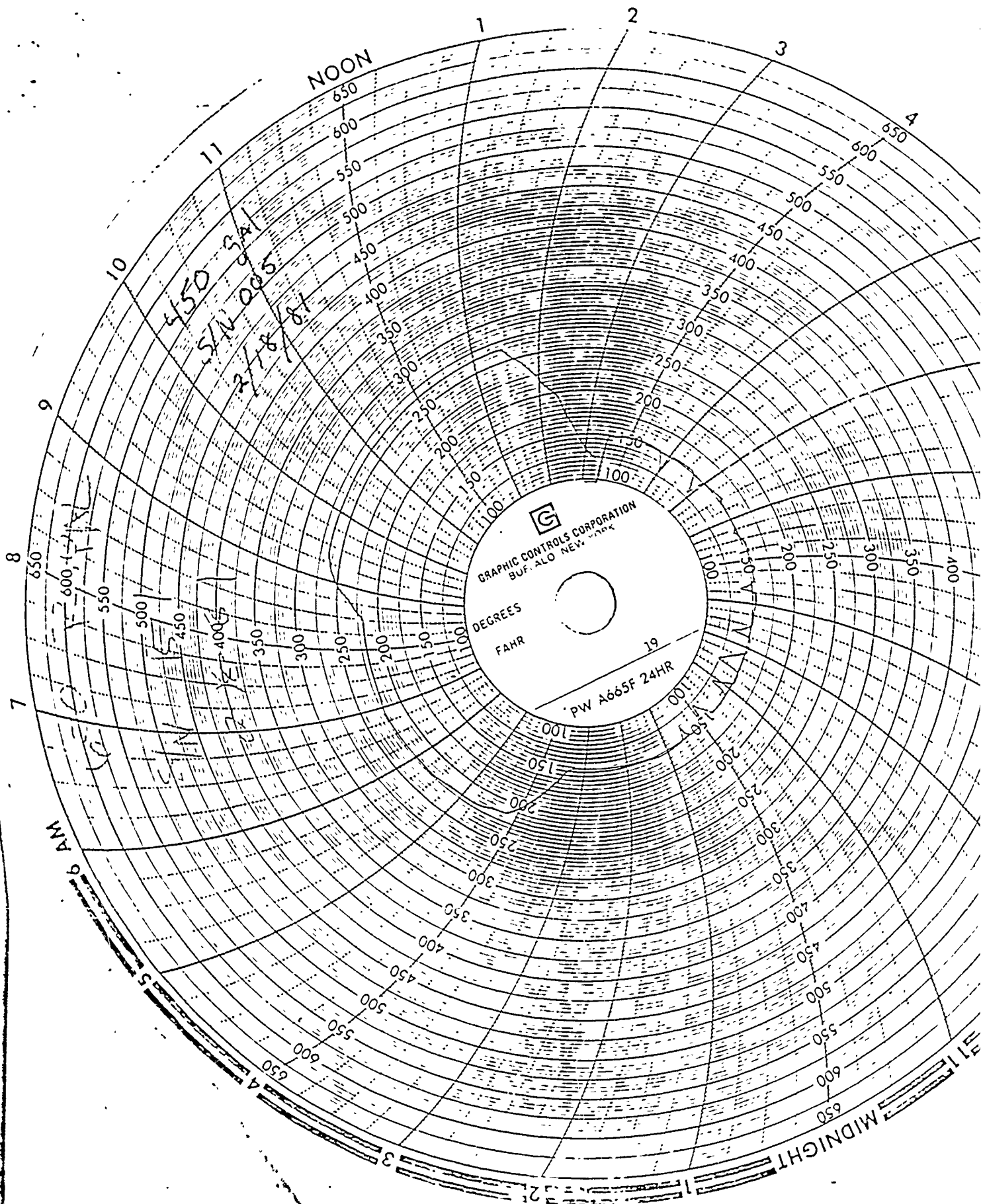
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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP- 2191 Section "A"

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION A  
INSPECTION DATA SHEETS  
S/N 0006



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. OTR-2191-001

DATE: 4-6-82 PAGE OF

# INSPECTION TEST DATA SHEET

QTR-2191 SECTION "A"

Inspection Activity FSI Activity Quality Engr. J.K. GEORGE  
 Tank Serial No. 006 F.S.I. Test Engr. \_\_\_\_\_  
 Inspection Date 2-20-81 Government Rep. \_\_\_\_\_

## INSPECTION EQUIPMENT REVIEW

Ref. Para. 4.1 List of inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

ITEM	WORKING CONDITION	REGULARLY CALIBRATED	LAST CALIBRATION DATE
1. <u>FE TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>2 JULY 80</u>
2. <u>INDICATOR</u>	<u>GOOD</u>	<u>YES</u>	<u>5 SEPT 80</u>
3. <u>FE TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>27 SEPT 80</u>
4. <u>CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>5 SEPT 80</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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INDIVIDUAL INSPECTION

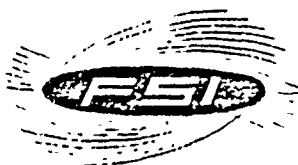
Ref. Para. 4.2: Individual Inspections performed

By J. George / D. Moser Date 2-5-81

INTERNAL CLEANLINESS INSPECTION

Ref. Para 4.2.1: LINT-FREE CLOTH WIPE INSPECTION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
Liner	<u>CLEAN</u>	<u>(Stamp: 25, 25, 25)</u>
Frames	<u>"</u>	<u>(Stamp: 25, 25, 25)</u>
Tubing	<u>"</u>	<u>(Stamp: 25, 25, 25)</u>
Bellmouth	<u>"</u>	<u>(Stamp: 25, 25, 25)</u>
Others:		
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH


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INSPECT LINER FOR LEAKAGE


Ref. Para 4.2.2: LINER PROOF PRESSURE

<u>ITEM</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
2.0 ± .25 psi	<u>NO LEAKS</u>	
Soap Bubble Test	_____	_____
Leaks (If any)	_____	_____

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSPECTION STAMP</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

LINER DIAMETER INSPECTION

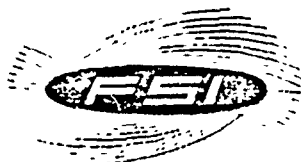
Ref. Para. 4.2.3: LINER MEASURED TO THE REQUIREMENTS OF FIGURE 1

<u>LOCATION</u>	<u>DIAMETER</u>	<u>INSPECTION STAMP</u>
A. _____	<u>28.538</u>	
B. _____	<u>28.481</u>	_____
C. _____	<u>28.532</u>	_____
D. _____	<u>28.450</u>	_____

COMPOSITE CONSTRUCTION INSPECTION

Ref. Para. 4.2.4: Composite Construction Inspection performed

By R. Jensen, M. Cunniff Date 12-20-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

DATE: 12/1/80

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FILAMENT WINDING EQUIPMENT

Ref. Para. 4.2.4.1: INSPECT EQUIPMENT CAPABILITIES

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Circumferential Capabilities _____		
Helical Capabilities _____		
Machine Program _____		

ROVING DEGRATION

<u>ITEM</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
Fiber Creel _____		
Resin Bath _____		
Spreader Bar _____		
Winding Eye _____		
Guide Eyes (If Applicable) _____		
Direction Control Bars (If Applicable) _____		

ROVING GAP

Ref. Para. 4.2.4.3: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. _____	<i>close</i>	
2. _____		
3. _____		
4. _____		




FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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ROVING BRIDGING

Ref. Para. 4.2.4.4: SHALL NOT EXCEED .50 INCHES BY 12.00 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. _____	NONE	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____


ROVING SLIPPAGE

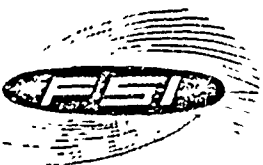
Ref. Para. 4.2.4.5: SHALL NOT EXCEED .25 INCHES

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. _____	NONE	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

ROVING KNOTS

Ref. Para. 4.2.4.6: SHALL NOT EXIST WITHOUT REMOVAL

<u>LOCATION</u>	<u>REMARKS</u>	<u>INSP.</u> <u>STAMP</u>
1. _____	NONE	
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

DATE. 12/1/80

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ROVING RESIN CONTROL

Ref. Para. 4.2.4.7: VERIFY COMPLETE INPREGNATION

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

INSPECTION STAMP: \_\_\_\_\_

UNIFORM COMPOSITE CONSTRUCTION

Ref. Para. 4.2.4.8: VERIFY MANUFACTURING PROCESS IN COMPLIANCE WITH  
ENGINEERING REQUIREMENTS, INCLUDING WEIGHT

ITEM

REMARKS

INSP.  
STAMP

Liner Weight 52.60

Manufacturing 105.5

Process Compliance \_\_\_\_\_

\_\_\_\_\_

Cured Assembly Weight 232.7

52

52

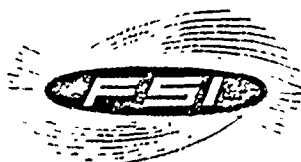
52

52

COMPOSITE CONSTRUCTION TESTING

Ref. Para. 4.2.5: Composite Construction Testing performed

By R. Ackinson Date 2-10-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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### RESIN CONTENT

REF: Para 4.2.5.1

Verify resin content of approximately 50 feet of impregnated roving. Shall be 50%  $\pm$  5% by volume.

<u>ITEM</u>	<u>LENGTH</u>	<u>WEIGHT</u>
Dry S-2 Glass Roving	<u>30</u>	<u>60.2</u>
Impregnated Roving	<u>30</u>	<u>80.2</u>
Calculated Resin Content	<u>36.12 %</u>	


Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

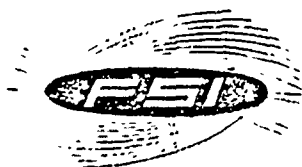
### LAP SHEAR TESTING

REF: Para. 4.2.5.2

Prepare Lap Shear per Figure 3.

NOTE: Test method per ASTM-D-1002 method 64 (minimum value 200 psi)

<u>SAMPLE</u>	<u>CURE TEMP.</u>	<u>CURE TIME</u>	<u>TEST VALUE</u>
1	<u>275 F</u>	<u>4 1/2</u>	<u>1272 PSI</u>
2			<u>1242 PSI</u>
3			<u>1126 PSI</u>
4			<u>1042 PSI</u>
5			<u>1126 PSI</u>
6			



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COMPOSITE SANDWICH CORE

REF: Para 4.2.5.3

Verify 250 psi compressive strength.

NOTE: Either a or b must comply.

a. Certified vendor test.

Remarks: FSI 20, A 2631 JOB L 242946

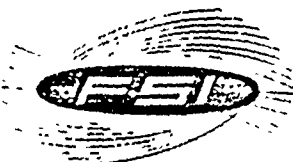
438 PSI, 412 PSI

MIL-C-81986 HERREL 12-16-80

12  
VSP

b. Lab test of 5 samples from each batch or lot  
each from a different sheet in the batch.

<u>Item</u>	<u>Tested Compressive Strength</u>
1	
2	
3	
4	
5	
6	



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "A"

DATE: 12/1/80 PAGE 22 OF 24

### STRUCTURAL COMPOSITE CURING

REF: Para 4.2.5.4

Verify proper cure cycle to design requirements.

#### CURE TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>150° ± 20°F</u>	<u>150°</u>
Stage 2 <u>225° ± 10°F</u>	<u>215 - 220°</u>
Stage 3 <u>275° ± 10°F</u>	<u>270°</u>
Stage 4 _____	_____

#### TIME AT TEMPERATURE

<u>Design Requirements</u>	<u>Actual Values</u>
Stage 1 <u>4 HRS</u>	<u>4 - 25</u>
Stage 2 <u>4 HRS</u>	<u>4/11 HRS</u>
Stage 3 <u>4 HRS</u>	<u>4 HRS</u>
Stage 4 _____	_____

NOTE: If temperature recorder was used, attach a copy of recorder sheet.



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EVALUATION OF DATA

TANK LINER FABRICATION: \_\_\_\_\_

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FILAMENT WINDING OF TANK: \_\_\_\_\_

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TANK COMPOSITE CURING: \_\_\_\_\_

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EXAMINATION OF CURED: \_\_\_\_\_

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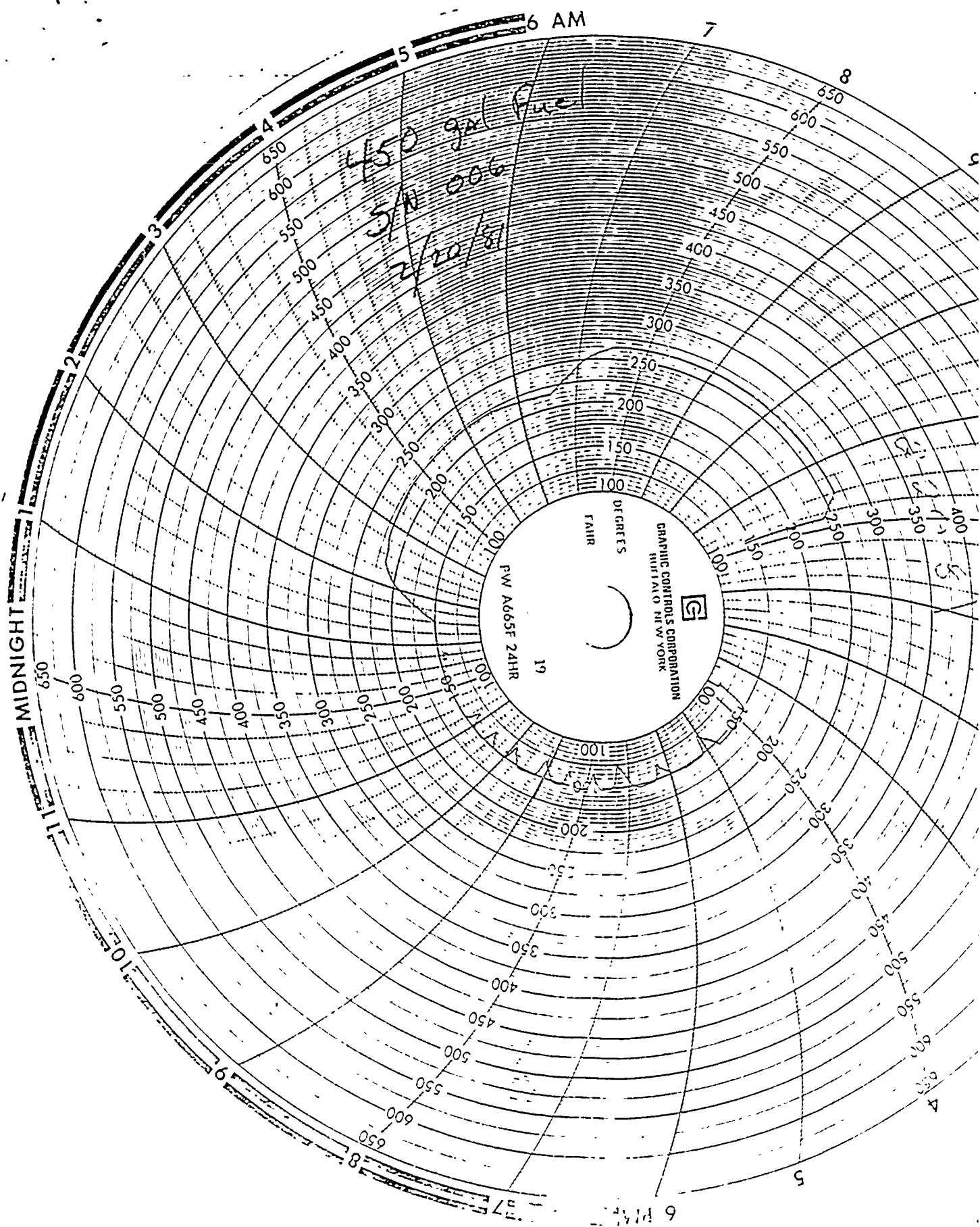
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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP- 2191 Section "A"

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
SECTION B  
PRODUCT EXAMINATION DATA SHEETS  
S/N 0001



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

PRODUCT EXAMINATION DATA SHEET

QTR-2191 SECTION "B"

Inspection Activity FIBER SCIENCE Activity Quality Engr. J. George

Tank Serial No. 001 F. S. I. Test Engr. D. LYMAN

Inspection Date \_\_\_\_\_ Government Rep. W. Ames

PRODUCT EXAMINATION EQUIPMENT REVIEW

Ref. Para. 4.1 List of examination inspection equipment used to verify the requirements of this procedure. List working condition, verify if equipment has been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. <u>1/2" CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>JULY 27, 80</u>
2. <u>0-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>AUG 2, 80</u>
3. <u>12"-36" PI TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>MAR 21 81</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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SUBMISSION FOR EXAMINATION

Ref. Para. 4.2 VERIFY COMPLETION OF FOLLOWING:

Completion of all Operations on Job Card through  
Final Assembly.

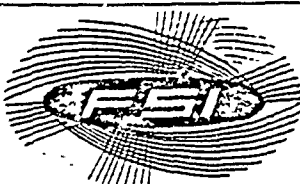
REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Verified By J. H. Hays Date 10 APR 81

Completion of Individual Inspection Requirements of  
QTP-2191 Section "A".

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Verified By J. H. Hays Date 10 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 10 OF 16

EXAMINATION OF PRODUCT

Ref. Para. 4.2.1 EXAMINED TO FOLLOWING CRITERIA

DESIGN DRAWINGS

Ref. Para. 4.2.1.1 TANK CONFORMS TO INSTALLATION DRAWING 2191-001

REVISION A-.

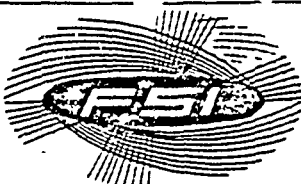
ITEM

REMARKS

IDENTIFICATION: TANK NOT IDENTIFIED PER  
DRAWING

DIMENSIONS: ACCEPTABLE - CONTOUR NOT INSPECTED  
AS NOT APPLICABLE

ASSEMBLY COMPLETENESS: ASS'Y COMPLETE  
13 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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CONSTRUCTION

Ref. Para. 4.2.1.2 TANK CONSTRUCTED IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4

REMARKS: COMPLIES -

COMPLIES WITH PARAGRAPH 3.2.5

REMARKS: COMPLETED

MATERIALS

Ref Para. 4.2.1.3 VERIFY CONSTRUCTION MATERIALS:

PURCHASED PARTS

REMARKS: COMPLETE & ACCEPTABLE

RAW MATERIALS

REMARKS: ALL MATERIALS WERE  
INSPECTED & ACCEPTED



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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WORKMANSHIP

Ref: Para. 4.2.1.4 TANK WORKMANSHIP IN ACCORDANCE WITH INDIVIDUAL INSPECTION REQUIREMENTS OF QTP-2191 SECTION "A"

COMPLIES WITH PARAGRAPH 3.2.4.3

REMARKS: ROVING GAPS DID NOT EXCEED  
0.25 INCHES PER QTP 2191 SECTION A  
PARA 4.2.4.3

COMPLIES WITH PARAGRAPH 3.2.4.4

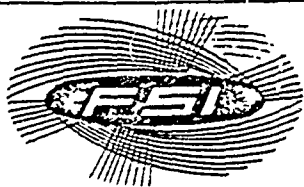
REMARKS: ROVING BRIDGING DID NOT  
EXCEED .50 INCH WIDE X 12 INCHS LONG  
PER QTP 2191 SECTION A PARA. 4.2.4.4

COMPLIES WITH PARAGRAPH 3.2.4.5

REMARKS: ROVING SLIPPAGE DID NOT EXCEED  
0.25 INCHES PER QTP 2191 SECTION A  
PARA 4.2.4.5

COMPLIES WITH PARAGRAPH 3.2.4.6

REMARKS: ROVING KNOTS WERE REMOVED  
AND ROVINGS OVERLAPPED PER STD  
WINDING PROCEDURES. QTP 2191  
SECTION A PARA 4.2.4.6



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 SECTION "B"

DATE: 1/14/81

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EXTERIOR SURFACE FINISH

Ref. Para. 4.2.1.5 TANK EXTERIOR SURFACE IN ACCORDANCE WITH TECHNICAL EXHIBIT ASD/ENFEA-78

COMPLIES WITH PARAGRAPH 4.6.1.1

REMARKS: TANK EXTERIOR SURFACE IS  
AS WOUND & PAINTED

EXTERIOR SURFACE MARKINGS

Ref. Para. 4.2.1.6 TANK EXTERIOR MARKINGS IN ACCORDANCE WITH INSTALLATION DRAWING 2191-001

COMPLIES WITH DRAWING AND PARAGRAPH 3.10.2. of ASD/ENFEA-78

REMARKS: EXTERIOR MARKINGS OF TANK  
DID NOT CONFORM TO Dwg & PARA  
3.10.2 SEE DR 1114



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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INTERCHANGEABILITY

Ref. Para. 4.2.1.7 INTERCHANGEABILITY OF ALL REPLACEABLE OR INTERFACE PARTS

INTERCHANGEABILITY WITH PYLON MASTER GAGE

REMARKS: WORKING MASTER  
WAS USED & FIT WAS ACCEPTABLE

INTERCHANGEABILITY OF REPLACEABLE PARTS

<u>PART NO.</u>	<u>REMARKS</u>
1.	<u>WILL BE VERIFIED ON TANK 0003</u>
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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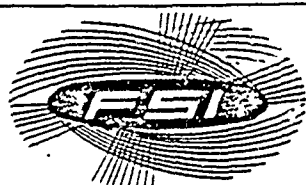
EVALUATION OF DATA

DESIGN: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONSTRUCTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WORKMANSHIP: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXTERIOR FINISH: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION B  
PRODUCT EXAMINATION DATA SHEETS  
S/N 0003



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

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PRODUCT EXAMINATION DATA SHEET

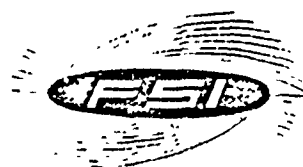
QTR-2191 SECTION "B"

Inspection Activity FIBER SCIENCE Activity Quality Engr. J.R. George  
 Tank Serial No.        F. S. I. Test Engr.         
 Inspection Date 4-15-81 Government Rep. W. HIES

PRODUCT EXAMINATION EQUIPMENT REVIEW

Ref. Para. 4.1 List of examination inspection equipment used to verify the requirements of this procedure.  
 List working condition, verify if equipment has been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. <u>12" MICRIS</u>	<u>GOOD</u>	<u>YES</u>	<u>7-1-80</u>
2. <u>1-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>7-1-80</u>
3. <u>12-36" PE TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>7-1-80</u>
4. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
5. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
6. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
7. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
8. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
9. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
10. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
11. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
12. <u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>



FIBER SCIENCE, INC.  
 SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 9 OF 16

SUBMISSION FOR EXAMINATION

Ref. Para. 4.2 VERIFY COMPLETION OF FOLLOWING:

Completion of all Operations on Job Card through  
Final Assembly.

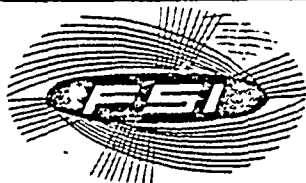
REMARKS: COMPLETE

Verified By J. Wilson Date 11 APR 81

Completion of Individual Inspection Requirements of  
QTP-2191 Section "A".

REMARKS:

Verified By J. Wilson Date 11 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 10 OF 16

EXAMINATION OF PRODUCT

Ref. Para. 4.2.1 EXAMINED TO FOLLOWING CRITERIA

DESIGN DRAWINGS

Ref. Para. 4.2.1.1 TANK CONFORMS TO INSTALLATION DRAWING 2191-001

REVISION A.

ITEM

REMARKS

IDENTIFICATION: TANK NOT IDENTIFIED FOR  
DRAWING

DIMENSIONS: ACCEPTABLE - CONTAINER NOT  
IDENTIFIED AS NOT APPLICABLE

ASSEMBLY COMPLETENESS: NOT COMPLETE -  
15 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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CONSTRUCTION

Ref. Para. 4.2.1.2 TANK CONSTRUCTED IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4

REMARKS: COMPLIES

COMPLIES WITH PARAGRAPH 3.2.5

REMARKS: COMPLETE

MATERIALS

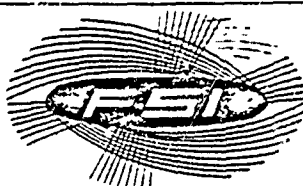
Ref Para. 4.2.1.3 VERIFY CONSTRUCTION MATERIALS:

PURCHASED PARTS

REMARKS: COMPLETE - & ACCEPTABLE

RAW MATERIALS

REMARKS: INSPECTED & ACCEPTED



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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WORKMANSHIP

Ref: Para. 4.2.1.4 TANK WORKMANSHIP IN ACCORDANCE WITH INDIVIDUAL INSPECTION REQUIREMENTS OF QTP-2191 SECTION "A"

COMPLIES WITH PARAGRAPH 3.2.4.3

REMARKS: ROVING GAPS DID NOT EXCEED  
.25 INCHES PER QTP 2191 SECTION 4  
PARA. 4.2.4.3

COMPLIES WITH PARAGRAPH 3.2.4.4

REMARKS: ROVING BRIDGING DID NOT  
EXCEED .5" FROM UNDER 2" LINES  
PER QTP 2191 SECTION 4 PARA. 4.2.4.4

COMPLIES WITH PARAGRAPH 3.2.4.5

REMARKS: ROVING SURFACE DID NOT EXCEED  
.25" FROM UNDER 2" LINES

COMPLIES WITH PARAGRAPH 3.2.4.6

REMARKS: ROVING KNOTS WERE REMOVED  
FROM ROVING - EXCEEDED .25" FROM  
UNDER 2" LINES - PER QTP 2191  
PARA 4.2.4.6



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 SECTION "B"

DATE: 1/14/81

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EXTERIOR SURFACE FINISH

Ref. Para. 4.2.1.5 TANK EXTERIOR SURFACE IN ACCORDANCE WITH TECHNICAL EXHIBIT ASD/ENFEA-78

COMPLIES WITH PARAGRAPH 4.6.1.1

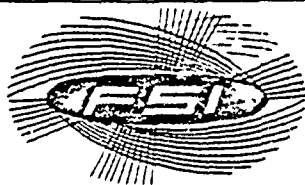
REMARKS: TANK EXTERIOR SURFACE IS  
AS WOULD BE PAINTED

EXTERIOR SURFACE MARKINGS

Ref. Para. 4.2.1.6 TANK EXTERIOR MARKINGS IN ACCORDANCE WITH INSTALLATION DRAWING 2191-001

COMPLIES WITH DRAWING AND PARAGRAPH 3.10.2. of ASD/ENFEA-78

REMARKS: EXTERIOR MARKINGS ARE  
DID NOT CONFORM TO Dwg. 2191-001



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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INTERCHANGEABILITY

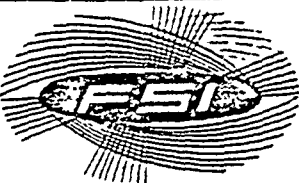
Ref. Para. 4.2.1.7 INTERCHANGEABILITY OF ALL REPLACEABLE OR INTERFACE PARTS

INTERCHANGEABILITY WITH PYLON MASTER GAGE

REMARKS: WORKING MASTER WAS USED  
FOR INTERCHANGEABILITY AND FIT WAS  
ACCEPTABLE

INTERCHANGEABILITY OF REPLACEABLE PARTS

<u>PART NO.</u>	<u>REMARKS</u>
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 15 OF 16

EVALUATION OF DATA

DESIGN: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONSTRUCTION: \_\_\_\_\_

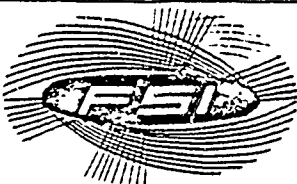
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WORKMANSHIP: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXTERIOR FINISH: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION B  
PRODUCT EXAMINATION DATA SHEETS  
S/H 0004



**FIBER SCIENCE, INC.**  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

PRODUCT EXAMINATION DATA SHEET

QTR-2191 SECTION "B"

Inspection Activity FIBER SCIENCE Activity Quality Engr. J.K. George  
Tank Serial No. 0004 F. S. I. Test Engr. R. LYMAN  
Inspection Date 4-15-81 Government Rep. W. Ames

PRODUCT EXAMINATION EQUIPMENT REVIEW

Ref. Para. 4.1 List of examination inspection equipment used  
to verify the requirements of this procedure.  
List working condition, verify if equipment has  
been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. <u>12" CALIPERS</u>	<u>GOOD</u>	<u>YES</u>	<u>JULY 27, 80</u>
2. <u>0-1" MIC</u>	<u>GOOD</u>	<u>YES</u>	<u>JUL 16, 80</u>
3. <u>12-36" PI TAPE</u>	<u>GOOD</u>	<u>YES</u>	<u>AUG 2, 80</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

PAGE 9 OF 16

SUBMISSION FOR EXAMINATION

Ref. Para. 4.2 VERIFY COMPLETION OF FOLLOWING:

Completion of all Operations on Job Card through  
Final Assembly.

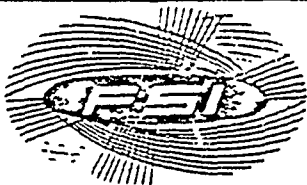
REMARKS: COMPLETE

Verified By J. K. [Signature] Date 10 APR 81

Completion of Individual Inspection Requirements of  
QTP-2191 Section "A".

PEMA [Signature]

Verified By J. K. [Signature] Date 10 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 10 OF 16

EXAMINATION OF PRODUCT

Ref. Para. 4.2.1 EXAMINED TO FOLLOWING CRITERIA

DESIGN DRAWINGS

Ref. Para. 4.2.1.1 TANK CONFORMS TO INSTALLATION DRAWING 2191-OC1

REVISION A.

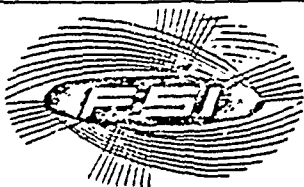
ITEM

REMARKS

IDENTIFICATION: TANK NOT IDENTIFIED PER  
DRAWING

DIMENSIONS: ACCEPTABLE - CONTOUR NOT  
INSPECTED AS NOT APPLICABLE

ASSEMBLY COMPLETENESS: ASS'Y COMPLETE -  
15 APR 81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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CONSTRUCTION

Ref. Para. 4.2.1.2 TANK CONSTRUCTED IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4

REMARKS: COMPLIES

COMPLIES WITH PARAGRAPH 3.2.5

REMARKS: COMPLETE

MATERIALS

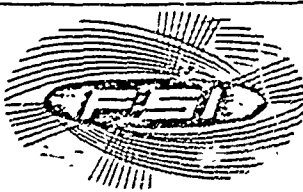
Ref Para. 4.2.1.3 VERIFY CONSTRUCTION MATERIALS:

PURCHASED PARTS

REMARKS: COMPLETE - & ACCEPTABLE

RAW MATERIALS

REMARKS: ALL MATERIALS WERE  
INSPECTED & ACCEPTED



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

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WORKMANSHIP

Ref: Para. 4.2.1.4 TANK WORKMANSHIP IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION "A"

COMPLIES WITH PARAGRAPH 3.2.4.3

REMARKS: ROVING GAPS DID NOT EXCEED  
.25 INCHES PER QTP 2191 SECTION A  
PARA. 4.2.4.3

COMPLIES WITH PARAGRAPH 3.2.4.4

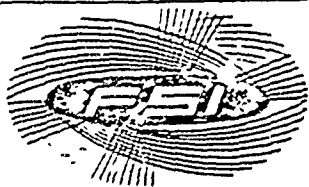
REMARKS: ROVING BRIDGING DID NOT  
EXCEED .50 INCH WIDE X 12" LONG  
PER QTP 2191 SECTION A PARA. 4.2.4.4

COMPLIES WITH PARAGRAPH 3.2.4.5

REMARKS: ROVING SLIPPAGE DID NOT EXCEED  
.25 INCHES PER QTP 2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4.6

REMARKS: ROVING KNOTS WERE REMOVED  
AND ROVINGS OVERLAPPED PER STD.  
WINDING PROCEDURES - QTP 2191 SECTION  
A PARA 4.2.4.6



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 SECTION "C"

DATE: 1/14/81

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EXTERIOR SURFACE FINISH

Ref. Para. 4.2.1.5 TANK EXTERIOR SURFACE IN ACCORDANCE WITH TECHNICAL EXHIBIT ASD/ENFEA-78

COMPLIES WITH PARAGRAPH 4.6.1.1

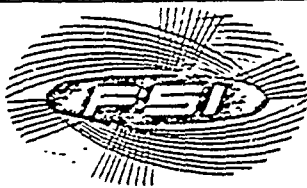
REMARKS: TANK EXTERIOR SURFACE IS  
AS WOUND & PAINTED

EXTERIOR SURFACE MARKINGS

Ref. Para. 4.2.1.6 TANK EXTERIOR MARKINGS IN ACCORDANCE WITH INSTALLATION DRAWING 2191-001

COMPLIES WITH DRAWING AND PARAGRAPH 3.10.2. of ASD/ENFEA-78

REMARKS: EXTERIOR MARKINGS OF TANK  
DID NOT CONFORM TO DWG & PARA  
3.10.2 SEE DR 1014



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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INTERCHANGEABILITY

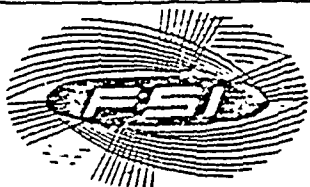
Ref. Para. 4.2.1.7 INTERCHANGEABILITY OF ALL REPLACEABLE OR INTERFACE PARTS

INTERCHANGEABILITY WITH PYLON MASTER GAGE

REMARKS: WORKING MASTER WAS USED  
FOR INTERCHANGEABILITY AND FIT WAS  
ACCEPTABLE

INTERCHANGEABILITY OF REPLACEABLE PARTS

<u>PART NO.</u>	<u>REMARKS</u>
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 15 OF 16

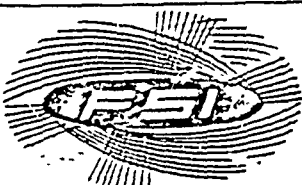
EVALUATION OF DATA

DESIGN: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONSTRUCTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WORKMANSHIP: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXTERIOR FINISH: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION B  
PRODUCT EXAMINATION DATA SHEETS  
S/N 0005



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82 PAGE OF

PRODUCT EXAMINATION DATA SHEET

QTR-2191 SECTION "B"

Inspection Activity FIBER SCIENCE Activity Quality Engr. \_\_\_\_\_

Tank Serial No. 0005 F. S. I. Test Engr. \_\_\_\_\_

Inspection Date \_\_\_\_\_ Government Rep. \_\_\_\_\_

PRODUCT EXAMINATION EQUIPMENT REVIEW

Ref. Para. 4.1 List of examination inspection equipment used  
to verify the requirements of this procedure.  
List working condition, verify if equipment has  
been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 9 OF 16

SUBMISSION FOR EXAMINATION

Ref. Para. 4.2 VERIFY COMPLETION OF FOLLOWING:

Completion of all Operations on Job Card through  
Final Assembly.

REMARKS: ASSEMBLY COMPLETED 3/30/81

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Verified By J. H. George Date 3-30-81

Completion of Individual Inspection Requirements of  
QTP-2191 Section "A".

REMARKS: SECTION A COMPLETED

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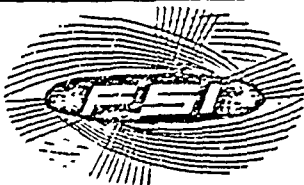
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Verified By J. H. George Date 3-30-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 10 OF 16



EXAMINATION OF PRODUCT

Ref. Para. 4.2.1 EXAMINED TO FOLLOWING CRITERIA

DESIGN DRAWINGS

Ref. Para. 4.2.1.1 TANK CONFORMS TO INSTALLATION DRAWING 2191-001

REVISION A.

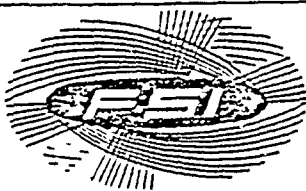
ITEM

REMARKS

IDENTIFICATION: NAME PLATE 2191-067 NOT  
AVAILABLE - NAME PLATE WAS TYPED WITH  
CORRECT INFORMATION - STENCILING ITEMS 12  
THRU 19 NOT COMPLETED DR 5916

DIMENSIONS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ASSEMBLY COMPLETENESS: ASSEMBLY COMPLETE  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81

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CONSTRUCTION

Ref. Para. 4.2.1.2 TANK CONSTRUCTED IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4

REMARKS: QTP SECTION A PARA. 4.2.4  
COMPLETE & ACCEPTABLE

COMPLIES WITH PARAGRAPH 3.2.5

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MATERIALS

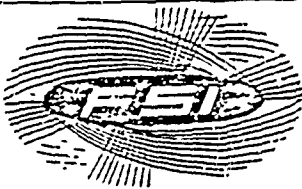
Ref Para. 4.2.1.3 VERIFY CONSTRUCTION MATERIALS:

PURCHASED PARTS

REMARKS: QTP SECTION A PARA. 4.2.5  
COMPLETE AND ACCEPTABLE

RAW MATERIALS

REMARKS: ALL RAW MATERIALS WERE  
ACCEPTED



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 12 OF 16

WORKMANSHIP

Ref: Para. 4.2.1.4 TANK WORKMANSHIP IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION "A"

COMPLIES WITH PARAGRAPH 3.2.4.3

REMARKS: ROVING GAPS DID NOT EXCEED  
.25 INCHES PER QTP 2191 SECTION A  
PARA. 4.2.4.3

COMPLIES WITH PARAGRAPH 3.2.4.4

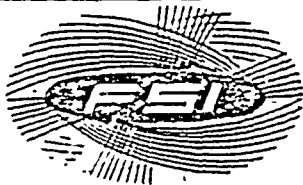
REMARKS: ROVING BRIDGING DID NOT EXCEED  
.50 INCH WIDE x 12 INCHS LONG. PER  
QTP 2191 SECTION A PARA. 4.2.4.4

COMPLIES WITH PARAGRAPH 3.2.4.5

REMARKS: ROVING SLIPPAGE DID NOT  
EXCEED .25 INCHES PER QTP 2191-  
SECTION A PARA 4.2.4.5

COMPLIES WITH PARAGRAPH 3.2.4.6

REMARKS: ROVING KNOTS WERE REMOVED  
AND ROVINGS OVERLAPPED PER STD  
WINDING PROCEDURES. QTP 2191 SECTION  
A PARA 4.2.4.6 INDICATES ACCEPTANCE



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 SECTION "B"

DATE: 1/14/81

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EXTERIOR SURFACE FINISH

Ref. Para. 4.2.1.5 TANK EXTERIOR SURFACE IN ACCORDANCE WITH TECHNICAL EXHIBIT ASD/ENFEA-78

COMPLIES WITH PARAGRAPH 4.6.1.1

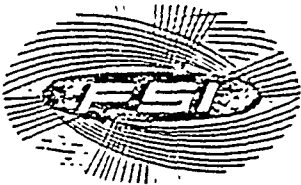
REMARKS: TANK EXTERIOR SURFACE IS  
AS WOUND / PAINTED

EXTERIOR SURFACE MARKINGS

Ref. Para. 4.2.1.6 TANK EXTERIOR MARKINGS IN ACCORDANCE WITH INSTALLATION DRAWING 2191-001

COMPLIES WITH DRAWING AND PARAGRAPH 3.10.2. of ASD/ ENFEA-78

REMARKS: EXTERIOR MARKINGS OF TANK  
DO NOT CONFORM TO DWG & PARA.  
3.10.2 SEE LR 5916



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "B"

DATE: 1/14/81 PAGE 14 OF 16

INTERCHANGEABILITY

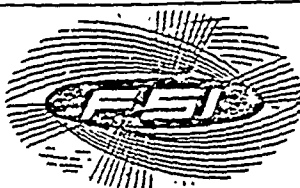
Ref. Para. 4.2.1.7 INTERCHANGEABILITY OF ALL REPLACEABLE OR INTERFACE PARTS

INTERCHANGEABILITY WITH PYLON MASTER GAGE

REMARKS: WORKING MASTER WAS  
USED AND FIT WAS ACCEPTABLE

INTERCHANGEABILITY OF REPLACEABLE PARTS

<u>PART NO.</u>	<u>REMARKS</u>
1.	<u>WILL BE VERIFIED ON TANKS 5/1/0003</u>
2.	<u>624</u>
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	



FIBER SCIENCE, INC.  
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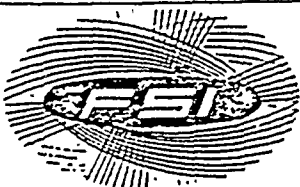
EVALUATION   DATA

DESIGN: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONSTRUCTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WORKMANSHIP: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXTERIOR FINISH: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION B  
PRODUCT EXAMINATION DATA SHEETS  
-S/N 0006



*FIBER SCIENCE, INC.*  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

PRODUCT EXAMINATION DATA SHEET

QTR-2191 SECTION "B"

Inspection Activity FIBER SCIENCE Activity Quality Engr. \_\_\_\_\_

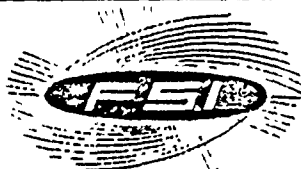
Tank Serial No. 0006 F. S. I. Test Engr. \_\_\_\_\_

Inspection Date 3/30/81 Government Rep. \_\_\_\_\_

PRODUCT EXAMINATION EQUIPMENT REVIEW

Ref. Para. 4.1 List of examination inspection equipment used  
to verify the requirements of this procedure.  
List working condition, verify if equipment has  
been regularly calibrated and last calibration date.

<u>ITEM</u>	<u>WORKING CONDITION</u>	<u>REGULARLY CALIBRATED</u>	<u>LAST CALIBRATION DATE</u>
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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SUBMISSION FOR EXAMINATION

Ref. Para. 4.2 VERIFY COMPLETION OF FOLLOWING:

Completion of all Operations on Job Card through  
Final Assembly.

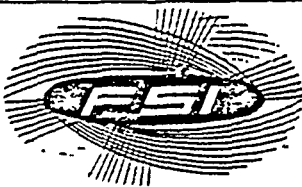
REMARKS: ASSEMBLY COMPLETED 3/30/81

Verified By John George Date 3-30-81

Completion of Individual Inspection Requirements of  
QTP-2191 Section "A".

REMARKS: SECTION A COMPLETED

Verified By John George Date 3-30-81



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 1/14/81

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EXAMINATION OF PRODUCT

Ref. Para. 4.2.1 EXAMINED TO FOLLOWING CRITERIA

DESIGN DRAWINGS

Ref. Para. 4.2.1.1 TANK CONFORMS TO INSTALLATION DRAWING 2191-001

REVISION A.

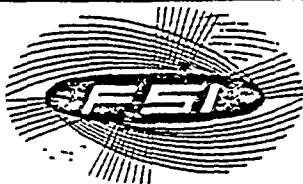
ITEM

REMARKS

IDENTIFICATION: NAME PLATE 2191-067 NOT  
AVAILABLE - NAMEPLATE WAS TYPED WITH  
CORRECT INFORMATION - STENCILING ITEMS 12  
THRU 19 NOT COMPLETED DR 5916

DIMENSIONS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ASSEMBLY COMPLETENESS: ASSEMBLY COMPLETE  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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CONSTRUCTION

Ref. Para. 4.2.1.2 TANK CONSTRUCTED IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION A

COMPLIES WITH PARAGRAPH 3.2.4

REMARKS: QTP SECTION A PARA 4.2.4

COMPLETE & ACCEPTABLE

COMPLIES WITH PARAGRAPH 3.2.5

REMARKS: \_\_\_\_\_

MATERIALS

Ref Para. 4.2.1.3 VERIFY CONSTRUCTION MATERIALS:

PURCHASED PARTS

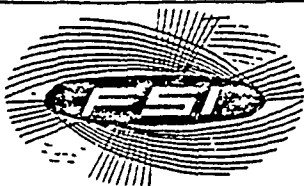
REMARKS: QTP SECTION A PARA 4.25

COMPLETE AND ACCEPTABLE

RAW MATERIALS

REMARKS: ALL RAW MATERIALS WERE

ACCEPTED



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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WORKMANSHIP

Ref: Para. 4.2.1.4 TANK WORKMANSHIP IN ACCORDANCE WITH INDIVIDUAL  
INSPECTION REQUIREMENTS OF QTP-2191 SECTION "A"

COMPLIES WITH PARAGRAPH 3.2.4.3

REMARKS: ROVING GAPS DID NOT EXCEED .25  
INCHES PER QTP 2191 SECTION A PARA  
4.2.4.3

COMPLIES WITH PARAGRAPH 3.2.4.4

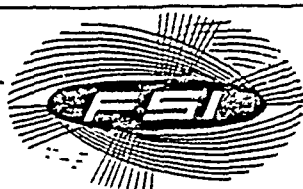
REMARKS: ROVING BRIDGING DID NOT  
EXCEED .5 INCH X 12 INCHES LONG PER  
QTP 2191 SECTION A PARA 4.2.4.4

COMPLIES WITH PARAGRAPH 3.2.4.5

REMARKS: ROVING SLIPPAGE DID NOT EXCEED  
.25 INCHES PER QTP 2191 SECTION A  
PARA 4.2.4.5

COMPLIES WITH PARAGRAPH 3.2.4.6

REMARKS: ROVING KNOTS WERE REMOVED  
AND ROVINGS OVERLAPPED PER STD  
WINDING PROCEDURES. QTP 2191 SECTION  
A PARA 4.2.4.6 INDICATES ACCEPTANCE



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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EXTERIOR SURFACE FINISH

Ref. Para. 4.2.1.5 TANK EXTERIOR SURFACE IN ACCORDANCE WITH TECHNICAL EXHIBIT ASD/ENFEA-78

COMPLIES WITH PARAGRAPH 4.6.1.1

REMARKS: TANK EXTERIOR SURFACE IS

A WOUND / PAINTED

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EXTERIOR SURFACE MARKINGS

Ref. Para. 4.2.1.6 TANK EXTERIOR MARKINGS IN ACCORDANCE WITH INSTALLATION DRAWING 2191-001

COMPLIES WITH DRAWING AND PARAGRAPH 3.10.2. of ASD/ ENFEA-78

REMARKS: EXTERIOR MARKING OF TANK

DO NOT CONFORM TO DING & PARA.

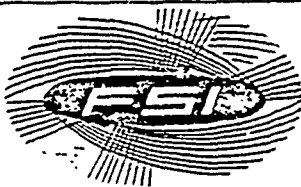
3.10.2 SEE DR 5916

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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 1/14/81 PAGE 14 OF 16

### INTERCHANGEABILITY

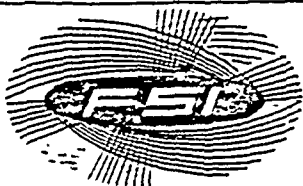
Ref. Para. 4.2.1.7 INTERCHANGEABILITY OF ALL REPLACEABLE OR INTERFACE PARTS

INTERCHANGEABILITY WITH PYLON MASTER GAGE

REMARKS: WORKING MASTER WAS USED  
AND FIT WAS UNACCEPTABLE SEE  
DR 5916

INTERCHANGEABILITY OF REPLACEABLE PARTS

<u>PART NO.</u>	<u>REMARKS</u>
1.	<u>WILL BE VERIFIED ON TANKS</u>
2.	<u>S/N 000310006</u>
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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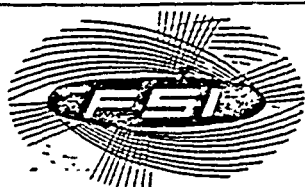
EVALUATION OF DATA

DESIGN: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONSTRUCTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WORKMANSHIP: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

EXTERIOR FINISH: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION C  
TEST DATA SHEETS  
S/N 0005



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 4-6-82

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OF



TEST DATA SHEET

QTR-2.1 SECTION "C"

Testing Activity FIBER SCIENCE Activity Test Engr. \_\_\_\_\_

Tank Serial No. 0005 F.S.I. Test Engr. \_\_\_\_\_

Test Date 3/29/81 Government Rep. \_\_\_\_\_

SUBMISSION FOR CONTOUR INSPECTION

Ref. Para. 4.1: Completeness of Assembly: ASSEMBLY COMPLETE  
PER QTP 2191 SECTIONS A & B

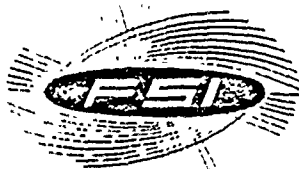
Compliance with Previous Qualification Tests: SEE  
ABOVE

Visual Inspection: SEE QTP 2191 SECTION A  
ACCEPTABLE

INSTRUMENTATION AND TEST EQUIPMENT CALIBRATION

Ref. Para 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
1. <u>GAGE BLOCKS FS1116</u>	<u>23 JUNE 80</u>
2. <u>OPTICAL LEVEL FS127</u>	<u>20 NOV 80</u>
3. <u>PINS FS219</u>	<u>27 JUL 80</u>
4. <u>PINS FS428</u>	<u>2 NOV 80</u>
5. <u>MIC 0-1" FS103</u>	<u>2 AUG 80</u>
6. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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CONTOUR TEMPLATE ACCURACY

Ref. Para. 4.2.2: VERIFY ACCURACY OF CONTOUR TEMPLATE

Contour Coordinate Document

REMARKS: DWG 2191-006 & MFG W.O.

Contour Template Characteristics  
(That is stand off or net fit template and how used)

REMARKS: THE TANK WAS LEVELED WITH AN  
OPTICAL LEVEL. THE TEMPLATE WAS LEVELED  
TO THE TANK WITH THE SAME OPTICAL LEVEL.  
THE FWD END OF THE TEMPLATE WAS STOOD  
OFF .300 FROM THE POLAR CAP & C OF THE TANK.

Inspection for Accuracy

REMARKS: WITHIN  $\pm .030$

NOTE: Supply inspection of template data sheet.



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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TANK CONTOUR

Ref. Para. 4.3:

VERIFY COMPLIANCE OF TANK CONTOUR

Contour Tolerance from Engineering Drawing

Tolerance:  $\pm .125$

Contour Inspection

Forward Elliptical: WITHIN TOL

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Center Straight: .050

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Aft Elliptical: WITHIN TOL

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Pylon Contour Fit: PYLON WAS FIT TO TANK

AND IS ACCEPTABLE.

\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 3/31/81

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TANK CONTOUR

Ref. Para. 4.3: VERIFY COMPLIANCE OF CONTOUR SMOOTHNESS

Contour Smoothness Tolerance From  
Engineering Drawing

Tolerance:  $\pm .125$ <sup>6</sup>

Deviations If Any And Location: \_\_\_\_\_

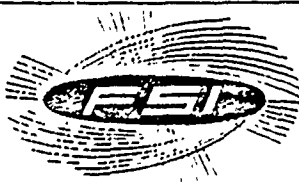
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Approximate Surface Finish (RMS)

1250 DOWN B&DV

2000 ON NOSE & TAIL

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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EVALUATION OF DATA

TANK CONTOUR: \_\_\_\_\_

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PYLON CONTOUR FIT: \_\_\_\_\_

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TANK CONTOUR SMOOTHNESS: \_\_\_\_\_

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APPROXIMATE SURFACE FINISH: \_\_\_\_\_

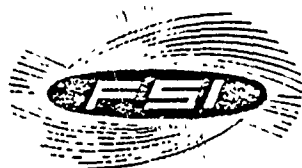
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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION C  
TEST DATA SHEETS  
S/N 0006



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

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TEST DATA SHEET

QTR-2191 SECTION "C"

Testing Activity FIBER SCIENCE Activity Test Engr. \_\_\_\_\_

Tank Serial No. 0006 F.S.I. Test Engr. \_\_\_\_\_

Test Date 3/30/81 Government Rep. \_\_\_\_\_

SUBMISSION FOR CONTOUR INSPECTION

Ref. Para. 4.1: Completeness of Assembly: ASSEMBLY COMPLETE  
3/30/81 PER QTP 2191 SECTIONS A & B

Compliance with Previous Qualification Tests: SECTION  
A COMPLETED, SECTION B COMPLETED

Visual Inspection: SEE QTP 2191 SECTION A -  
ACCEPTABLE

INSTRUMENTATION AND TEST EQUIPMENT CALIBRATION

Ref. Para 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
1. <u>GAGE BLOCKS FS1116</u>	<u>23 JUNE 80</u>
2. <u>OPTICAL LEVEL FS127</u>	<u>20 NOV 80</u>
3. <u>PIN 3 FS 219</u>	<u>27 JUL 80</u>
4. <u>PIN 3 FS 428</u>	<u>2 NOV 80</u>
5. <u>MIC. 0-1" FS103</u>	<u>2 AUG 80</u>
6. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "C"

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CONTOUR TEMPLATE ACCURACY

Ref. Para. 4.2.2: VERIFY ACCURACY OF CONTOUR TEMPLATE

Contour Coordinate Document

REMARKS: DASH 2191-006 & NFG W.D.

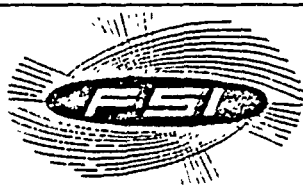
Contour Template Characteristics  
(That is stand off or net fit template and how used)

REMARKS: THE TANK WAS LEVELED WITH AN  
OPTICAL LEVEL. THE TEMPLATE WAS ALSO LEVELED  
WITH THE OPTICAL LEVEL. THE FWD END OF THE  
TEMPLATE WAS STOOD OFF 1300 FROM THE  
POLAR CAP &  $\phi$  OF THE TANK

Inspection for Accuracy

REMARKS: WITHIN  $\pm .030$

NOTE: Supply inspection of template data sheet.



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "C"

DATE: 3/31/81 PAGE 8 OF 11



TANK CONTOUR

Ref. Para. 4.3: VERIFY COMPLIANCE OF TANK CONTOUR

Contour Tolerance from Engineering Drawing

Tolerance:  $\pm .125$

Contour Inspection

Forward Elliptical: WITH TOL

Center Straight: .167

Aft Elliptical: WITH TOL

Pylon Contour Fit: PYLON CONTOUR FIT WAS  
ACCEPTABLE ; HOWEVER, PYLON ATTACHED  
DID NOT FIT SEE DR 5916



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "C"

DATE: 3/31/81 PAGE 9 OF 11

TANK CONTOUR

Ref. Para. 4.3:

VERIFY COMPLIANCE OF CONTOUR SMOOTHNESS

Contour Smoothness Tolerance From  
Engineering Drawing

Tolerance: ±.125

Deviations If Any And Location: WITHIN TOL

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Approximate Surface Finish (RMS)

1250 DOWN BODY

2000 ON NOSE & TAIL

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "C"

DATE: 3/31/81

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EVALUATION OF DATA

TANK CONTOUR: \_\_\_\_\_

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PYLON CONTOUR FIT: \_\_\_\_\_

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TANK CONTOUR SMOOTHNESS: \_\_\_\_\_

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APPROXIMATE SURFACE FINISH: \_\_\_\_\_

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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/N 0001



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity PROX. PUMP 2.2 Activity Test Engr. A. W. L. S.

Tank Serial No. 3001 F.S.I. Test Engr. "

Test Date 2-11-81 Government Rep.

EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: COMPLETE

Compliance with Previous Qualification Tests: COMPLETE

Visual Inspection: COMPLETE

INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

ITEM CALIBRATION DATE

Weighing Device 1000

Other Instruments:

1.

2.



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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Ref. Para. 4.2.2 CHECK PROPER OPERATION

ITEM

REMARKS

Weighing Device

Other Instruments:

1. \_\_\_\_\_

2. \_\_\_\_\_

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

ITEM

WEIGHT

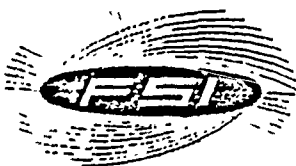
Tank Assembly

Pylon Assembly

Combined Assembly

273.4

404



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "D"

DATE: 2/11/81

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EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: \_\_\_\_\_

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PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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TANK AND PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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WEIGHING DEVICE: \_\_\_\_\_

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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "D"

DATE: 2/11/81

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/H 0002



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF



TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity Fiber Dismantling Activity Test Engr. R. J. Smith

Tank Serial No. 6552 F.S.I. Test Engr. James Smith

Test Date 4-10-81 Government Rep. James Smith

EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: COMPLETE - EXCEPT

FOR FUEL DRAIN OFF VALVE AND HOSE

SEALANT OFF VALVE HOSE

Compliance with Previous Qualification Tests: COMPLETE

Visual Inspection: COMPLETE & ACCEPTABLE

INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

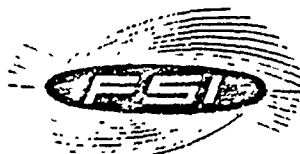
<u>ITEM</u>	<u>CALIBRATION DATE</u>
-------------	-------------------------

Weighing Device <u>Accu-Weigher</u>	<u>1-15-81</u>
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Other Instruments: \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "D"

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Ref. Para. 4.2.2 CHECK PROPER OPERATION

ITEM

REMARKS

Weighing Device

140214 NL

Other Instruments:

1. \_\_\_\_\_

2. \_\_\_\_\_

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

ITEM

WEIGHT

## Tank Assembly

74. —

## Pylon Assembly

۱۵۰

## Combined Assembly

34.2



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TANK AND PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WEIGHING DEVICE: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/N 0003



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE:

PAGE

OF

TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity مکملہ فیض Activity Test Engr. محمد

Tank Serial No. cr 3 F.S.I. Test Engr. N. G. G.

Test Date 5-7-81 Government Rep.                     

### EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: Yes

Compliance with Previous Qualification Tests:                     

Visual Inspection: no visible mold

## INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
-------------	-------------------------

Weighing Device NOVA-4000 571

Other Instruments: \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "D"

DATE: 2/11/81      PAGE 6 OF 8

Ref. Para. 4.2.2 CHECK PROPER OPERATION

ITEM

REMARKS

Weighing Device

Other Instruments:

1. \_\_\_\_\_

2. \_\_\_\_\_

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

ITEM

WEIGHT

Tank Assembly

Pylon Assembly

Combined Assembly

286.4

15.5

301.9



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 2/11/81

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EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: \_\_\_\_\_

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PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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TANK AND PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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WEIGHING DEVICE: \_\_\_\_\_

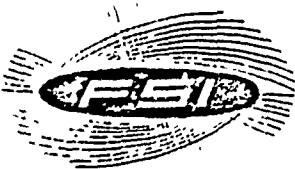
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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/N 0004



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 4-6-82 PAGE OF



TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity Fiber Science Activity Test Engr. A. L. H. A.  
Tank Serial No. 1001 F.S.I. Test Engr. K. L. H. A.  
Test Date 4-16-81 Government Rep. J. L. H. A.

EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: COMPLETE - EXCEPT FOR  
THE FUSE AND FUSE SHUTTER IN THE  
AIR SHUTTER IN THE AIR  
Compliance with Previous Qualification Tests: 2.1.1.1

Visual Inspection: COMPLETE & ACCEPTABLE

INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
Weighing Device, <u>1000-0.0001</u>	<u>11-15-79</u>
Other Instruments:	
1. _____	_____
2. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 2/11/81 PAGE 6 OF 8

Ref. Para. 4.2.2 CHECK PROPER OPERATION

ITEM

REMARKS

Weighing Device

As Recd

Other Instruments:

1. \_\_\_\_\_

2. \_\_\_\_\_

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

ITEM

WEIGHT

Tank Assembly

677.8

Pylon Assembly

15.3

Combined Assembly

343.1



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: \_\_\_\_\_

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PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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TANK AND PYLON ASSEMBLY WEIGHT: \_\_\_\_\_

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WEIGHING DEVICE: \_\_\_\_\_

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FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/N 0005



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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PAGE

OF

TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity IS Activity Test Engr. \_\_\_\_\_  
Tank Serial No. 0005 F.S.I. Test Engr. \_\_\_\_\_  
Test Date 3/16 THRU 3/31 Government Rep. \_\_\_\_\_

EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: ASSEMBLY COMPLETED  
330

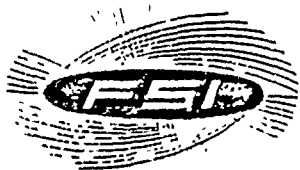
Compliance with Previous Qualification Tests: SECTION 1  
2 OF QTP COMPLETED - IN ACTION ATP COMPLETED

Visual Inspection: DR 5800 W/STEEL ON  
CLEANNESS OF INSIDE OF TANK

INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
Weighing Device <u>Accu-weigh</u>	<u>12-5-81</u>
Other Instruments:	_____
1. _____	_____
2. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 2/11/81 PAGE 6 OF 8

Ref. Para. 4.2.2 CHECK PROPER OPERATION

ITEM

REMARKS

Weighing Device

Other Instruments:

1. \_\_\_\_\_

2. \_\_\_\_\_

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

ITEM

WEIGHT

Tank Assembly

Pylon Assembly

Combined Assembly

277.8

64.0

341.8



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 2/11/81

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# EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: TANK WAS WEIGHED ON THE JUNE 10, 1981  
SINCE THE TANK WAS COMPLETED THE TANK  
PLATE WAS 277.8 LBS.

PYLON ASSEMBLY WEIGHT: THE PYLON WAS WEIGHED ON THE  
APRIL 10, 1981. THE TANK WAS 64 LBS.

TANK AND PYLON ASSEMBLY WEIGHT: THE WEIGHT OF THE  
277.8 AND THE PYLON WAS 64 LBS.

WEIGHING DEVICE: THE TANK WAS WEIGHED ON A  
TO 277.8 AT 500 LBS.



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION D  
TEST DATA SHEETS  
S/N 0006



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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DATE: 4-6-82

PAGE OF



TEST DATA SHEET

QTR-2191 SECTION "D"

Testing Activity FSI Activity Test Engr. \_\_\_\_\_  
Tank Serial No. 00710 F.S.I. Test Engr. \_\_\_\_\_  
Test Date 3/16 thru 3/31 Government Rep. \_\_\_\_\_

EXAMINATION OF PRODUCT

Ref. Para. 4.1: Completeness of Assembly: ASSEMBLY COMPLETED  
3/30/81

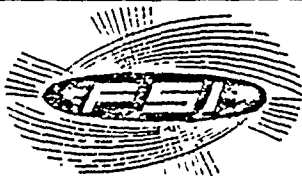
Compliance with Previous Qualification Tests: SECTION  
A OF QTP COMPLETED - IN ADDITION ATP 2191-001  
COMPLETED

Visual Inspection: DR 5880 WRITTEN ON  
CLEANNESS OF INSIDE OF TANK

INSTRUMENTATION

Ref. Para. 4.2.1: CHECK INSTRUMENTATION CALIBRATION

<u>ITEM</u>	<u>CALIBRATION DATE</u>
Weighing Device	<u>Accu-WEIGH 10/15/81</u>
Other Instruments:	_____
1. _____	_____
2. _____	_____



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "D"

DATE: 2/11/81 PAGE 6 OF 8

Ref. Para. 4.2.2 CHECK PROPER OPERATION

<u>ITEM</u>	<u>REMARKS</u>
Weighing Device	<u>OPERATIONAL NORMAL</u>
Other Instruments:	_____
1. _____	_____
2. _____	_____

ASSEMBLED TANK WEIGHT

Ref. Para. 4.3: WEIGH COMPLETELY ASSEMBLED TANK AND PYLON

<u>ITEM</u>	<u>WEIGHT</u>
Tank Assembly	<u>232.6</u>
(-- Pylon Assembly	<u>64.0</u>
Combined Assembly	<u>346.6</u>



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SALT LAKE CITY, UTAH

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DATE: 2/11/81

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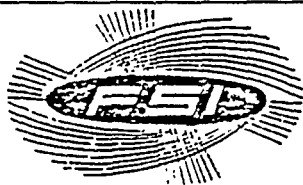
## EVALUATION OF DATA

TANK ASSEMBLY WEIGHT: THE TANK WAS WEIGHED ON THE 1000 LB. DIGITAL SCALES CALIBRATED 10/81, AND FOUND TO BE 300.6 LBS. THE TANK WEIGHT WAS SUBTRACTED FOR A BALANCED TANK WEIGHT LOSS MEASUREMENT.

PYLON ASSEMBLY WEIGHT: THE PYLON WAS WEIGHED ON THE 1000 LB. SCALES, THE WEIGHT OF THE PYLON WAS 40.0 LBS.

TANK AND PYLON ASSEMBLY WEIGHT: THE WEIGHT OF THE TANK 300.6 AND THE PYLON WERE ADDED FOR A TOTAL WEIGHT OF 340.6

WEIGHING DEVICE: THE WEIGHING DEVICE IS A 1000 LB. DIGITAL SCALES AT 500 LBS.



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

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APPENDIX "B"  
QUALIFICATION TEST REPORTS  
QTR - 2191  
-SECTION E  
FUNCTIONAL TEST



*FIBER SCIENCE, INC.*  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

REPORT NO. 43.702

DATED 7-30-81

FSCM NO. 72429

## SARGENT-FLETCHER COMPANY

A SUBSIDIARY OF A. J. INDUSTRIES, INC.



TANK QUALIFICATION TEST REPORT  
FIBER SCIENCE INC.  
H53 450 GALLON TANK

APPROVED

MODEL H53-2191

COPY NO.

REFERENCE

ISSUED AUG 24 1981

QUALIFICATION TESTS  
FIBER SCIENCE 450 GALLON TANK  
TYPE H53

INTRODUCTION

This report describes the qualification tests performed on the Fiber Science Inc., H53-2191 450 gallon fuel tanks, Serial Numbers 0005 and 0006.

The tests were carried out in accordance with the qualification test procedures (Q.T.P. 2191) amended to take into account the different test equipment, test fixtures, test set ups and methods of test used at Sargent Fletcher Company, the testing agency.

Initial test results deviated from those specified. Subsequent investigations revealed manufacturing defects which were repaired and the tests repeated as required.

Some results also show deviation from military standards and these have been highlighted in the conclusion to the data sheets.

All paragraph numbers in this report correspond to the appropriate paragraph number used in the test procedures (Q.T.P.-2191). The test procedures were supplied by Fiber Science and are not included as part of this report.

## TEST SCHEDULES

The following tests were conducted on one or both the test articles:

TEST SCHEDULE (Fiber Science)	TANK 0005	NUMBER 0006
Q.T.P. 2121 Section 'E' Functional Test	x	x
Q.T.P. 2121 Section 'F' Leakage Test	x	x
Q.T.P. 2121 Section 'G' Capacity Test	x	x
Q.T.P. 2121 Section 'H' Weight and CG Test	x	
Q.T.P. 2191 Section 'J' Slosh & Vibration Test	x	x
Q.T.P. 2191 Section 'K' Environmental Test	x	
Q.T.P. 2191 Section 'L' Strength Test	x	

## GENERAL TEST ARRANGEMENT

All qualification tests completed by Sargent Fletcher Company (SF81-55) per Q.T.P.-2191 were done with the acceptance and approval of a Fiber Science and Government representative. Both the Fiber Science and testing representatives supervised the set up and testing of each tank. An authorized inspector was always present for required observation and inspection of each tank during all phases of the testing.

### Approved Test Arrangement:

Activity Project Engineer

Approved A. E. Ayton

Date 8-24-81

Activity Test Engineer

Approved Simon F. Bell

Date 8-10-81

F.S.I Project Engineer

Approved \_\_\_\_\_

Date \_\_\_\_\_

F.S.I. Test Engineer

Approved \_\_\_\_\_

Date \_\_\_\_\_

U.S.A.F. Representative

Approved \_\_\_\_\_

Date \_\_\_\_\_

Inspection completed by testing agency:

Authorized Inspectors

Inspection Completed By Simon F. Bell

Date 8-10-81

Inspection Completed By Simon F. Bell

Date 8-11-81

Inspection Completed By Simon F. Bell

Date 8-18-81



## ADMINISTRATIVE DATA

1) Purpose Of Test

To determine that the tank meets the requirements of the test procedures within the limitations of the test facility.

2) Manufacturer

Fiber Science Inc.

3) Manufacturers Model Number

H53-2191 - 450 Gallon

4) Manufacturers Serial Numbers

-0005 and 0006

Note: Product examination and inspection to Q.T.P. 2191 sections 'A' 'B' 'C' and 'D' were carried out prior to the tanks being received at Sargent-Fletcher and all records are held by Fiber Science Inc.

~~TEST QTP 2191 SECTIONC "E" FUNCTIONAL TEST~~  
TANK SERIAL NO. 0005

TEST DATE 4-15-81

PARA 4.1.1 GENERAL EXAMINATION

(See page iv)

PARA 4.1.2 COMPATIBILITY EXAMINATION

Visual inspection and delamination (tap test) were carried out by Fiber Science representative.

PARA 4.2 GENERAL TEST

The aircraft attachment was representative only as regards to the pylon, all other parts of the system are as shown in figure 2.

PARA 4.2.2 COMPATIBILITY TEST

Not applicable to off aircraft test set up.

PARA 4.3 GENERAL TEST

The test arrangement used and shown in figure 2 was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.3.2 COMPATIBILITY TEST

Not applicable to off aircraft test set up.

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Pressure Gauges (Air)	3-12-81	9-12-81
Pressure Gauges (Fuel)	4-17-81	10-7-81
Capacitance Brioge	11-25-80	5-25-81
Hydrometer	Not Applicable	
Load Cells (Dillon)	11-3-80	11-3-81
Digital Readout (Dillon)	11-2-80	11-3-81

PARA 4.4.2 INSTRUMENTATION MONITORING

All instrumentation readout recorded manually.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration period (or calibration date extended) and fully functional.

PARA 4.5.1 DRY FUEL TEST, SERIAL NO. 0005

High level float switch, open circuit; no low level switch fitted. Fuel capacitance gauge probe = 0 uuf (Pico Farads)

PARA 4.5.2 WET FUEL TEST

Fuel Flow Rate 10 P.S.I.G. @ 106.37 G.P.M

Tank Back Pressure (Air) 1 P.S.I.G. @ 40-55 G.P.M.

Tank Capacity

To H/L Float Switch 2881 lbs. 437.78 gals.

SG = 6.58 lbs/gallon

Note: High level float switch failed to operate when venting occurred.

Fuel Capacitance Probe Reading 0 uuf (Pico Farads).

PARA 4.5.3 DEFUELING TEST

AIR PRESSURE

FUEL FLOW RATE

20 P.S.I.G.

103.33 G.P.M.

22 P.S.I.G.

113.96 G.P.M.

26 P.S.I.G.

112.45 G.P.M.

Low Level Float Switch Indication Not Fitted

Empty Fuel Capacitance Probe Reading 0 uuf (Pico Farads)

~~PARA 4.5.4 DRAINABLE FUEL~~

2 lbs = 0.30 gals.

PARA 4.6.1 DRY FUEL TEST

Not Applicable

PARA 4.6.2 WET FUEL TEST

Not Applicable

PARA 4.6.3 DEFUELING TEST

Not Applicable

PARA 4.6.4 FUEL DRAIN

Not Applicable

Following the failure of the tank to meet the requirements of the test procedures the various components were removed to determine the cause. Subsequent checking showed an intermittent short of the gauge probe, and that the float switch was serviceable. Further investigation of the tank revealed an excessive trapped air space due to lack of vent holes in the upper frame structure, see figure 3. Additional venting was achieved by removal of one bolt at the top of each frame and the test repeated. (Reference page 11)

PARA 4.5.1 DRY FUEL TEST, SERIAL NO. 0005 (Repeat)

High level float switch, open circuit; no low level switch fitted. Fuel capacitance gauge probe = 75 uuf (Pico Farads)

Note: The results have been extracted from test data obtained during test referenced in Q.T.P. 2191 Section "G".

PARA 4.5.2 WET FUEL TEST

Flow Rate	See 1st Test Results
Tank Back Pressure (Air)	See 1st Test Results
Capacity At Float Switch	452.57 Gallons
High Lever Float Switch	Closed Circuit
Fuel Mass	3312 lbs
Fuel Capacitance Gauge Probe	157.0 uuf (Pico Farads)

PARA 4.5.3 DEFUELING TEST

Defueling Pressure/Flow	See 1st Test Results
Low Level Float Switch Indication	Switch Not Fitted
Fuel Capacitance Gauge probe reading	75 uuf (Pico Farads)

PARA 4.5.4 DRAINABLE FUEL

Fuel Drained	2 lbs - 0.30 Gallons
--------------	----------------------

PARA 4.6.1 DRY FUEL TEST

Not Applicable

PARA 4.6.2 WET FUEL TEST

Not Applicable

ADDITIONAL DATA:

The fuel capacitance probe readings were recorded for increments of fuel to the tank overspill point. (See Figure 4)

FUEL CAPACITY  
GALLONS

PROBE READING  
uuf (PICO FARADS)

72.5  
170.6  
219.3  
267.7  
316.4  
365.2  
414.2  
444.0  
452.6  
466.9

91.0  
111.5  
119.5  
127.5  
137.0  
143.0  
152.0  
156.0  
157.0  
157.0

TEST QTP 2191 SECTION "E" FUNCTIONAL TEST  
TANKS SERIAL NO. 0006

TEST DATE 4-10-81

PARA 4.1.1 GENERAL EXAMINATION

(See Page iv)

PARA 4.1.2 COMPATABILITY EXAMINATION

Visual inspection and delamination (tap test) were carried out by Fiber Science representatives.

PARA 4.2 GENERAL TEST

The aircraft attachment was representative only as regards the pylon, all other parts of the system are as shown in Figure 2.

PARA 4.2.2 CAPATABILITY TEST

Not applicable to off aircraft test set up.

PARA 4 GENERAL TEST

The test arrangement used and shown in figure 2 was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.3.2 COMPATABILITY TEST

Not applicable to off aircraft test set up.

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Pressure Gauges (Air)	3-12-81	9-12-81
Capacitance Bridge (Fuel)	4-17-81	10-7-81
Hydrometer	Not Applicable	
Load Cells (Dillon)	11-3-80	11-3-81
Digital Readout (Dillon)	11-2-80	11-3-81

~~PARA 4.4.2~~ ~~INSTRUMENTATION MONITORING~~

All instrumentation readouts recorded manually.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5.1 DRY FUEL TEST

High Level Float Switch Open Circuit

No Low Level Switch Fitted

Fuel Capacitance Gauge Probe = 76.6 uuf (Pico Farads)

PARA 4.5.2 WET FUEL TEST

Fuel Flow Rate 10 P.S.I.G. @ 118.8 G.P.M.

Tank Back Pressure (Air) 1.5 P.S.I.G. @ 52.4 G.P.M.

TANK CAPACITY

To H/L Float Switch 2924 lbs 445.5 Gallons

(Closed Circuit) S.G.=6.563 lbs/gallon

Fuel Capacitance Probe Reading 158.0 uuf (Pico Farads)

PARA 4.5.3 DEFUELING TEST

15 P.S.I.G. @ 85 G.P.M.

Empty Fuel Capacitance Probe Reading 74.9 uuf (Pico Farads)

PARA 4.5.4 DRAINABLE FUEL

1 lb = 0.15 gallons

PARA 4.6.1 DRY FUEL TEST

Not Applicable

PARA 4.6.2 WET FUEL TEST

Not Applicable



PARA 4.6.3 DEFUELING TEST

Not Applicable

para 4.6.4 FUEL DRAIN

Not Applicable

APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION F  
LEAKAGE TEST



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

TEST QTP SECTION "F" PRESSURE TEST  
TANK SERIAL NO. 0005

TEST DATE 4-16-81

PARA 4.1 PRODUCT EXAMINATION

Visual inspection and delamination (tap test) carried out, no damage found.

PARA 4.2 MOUNTING

The tank with attached pylon was set on a cradle with supports under each frame member. The cradle was positioned such that the tank attitude was 2<sup>0</sup> nose down, simulating the aircraft nominal ground standing attitude

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Pressure Gauge	12-22-80	6-22-81
Manometer	12-12-79	12-12-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5 FUELING

440 gallons of water @ 2<sup>0</sup> nose down.

Note: High level float switch not operational when tested.

PARA 4.6 POSITIVE PRESSURE TESTS

86 PSI pressure was held for 4 minutes.

Note: Diameter before applied pressure 29.4' O.D., during applied pressure 29.492' O.D.

PARA 4.6.1 LEAK CHECK

Visual inspection for water leakage on the tank surface showed no leakage through the laminations. All access covers, filler cap, and drain plug leaked. Actual examination of tank while at pressure was completed by the Fiber Science representative per prior agreement.

PARA 4.7 NEGATIVE PRESSURE TEST

-10 PSI vacuum was held for 4 minutes.

PARA 4.7.1 LEAK CHECK

No drop in vacuum

Note: Chromate tape was used during the negative pressure test on all access covers and the filler cap to check for surface leakage.

PARA 4.8 POST TEST EXAMINATION

Post test examination revealed no visible damage and no delamination.

Examination of the access covers and fittings of both tanks showed the threads to be in poor condition with areas of cracks and delamination. This resulted in leakage throughout the test program. Leakage was prevented during the vacuum test by the application of chromate tape around all the access covers.

Following the completion of "Test F", the tank was examined to determine the cause of low capacity, inoperative high level float switch, and inoperative fuel probe.

#### RESULTS-INOPERATIVE FLOAT SWITCH AND LOW CAPACITY.

The origin proved to be lack of air venting capability in both frames. Manual testing of the float switch showed it was serviceable. A bolt in the vicinity of each missing vent hole was removed to achieve the lost useable airspace. Increased capacity and an operational float switch resulted as seen during subsequent retesting of the tank. (See figure 3).

#### RESULTS-INOPERATIVE FUEL PROBE

Investigation isolated missing "u" bolts for the fuel transfer tubing responsible for the inoperative probe. The "u" bolts are required to prevent the fuel transfer tube from contacting the probe. Difficulty in probe installation and the incorrect installation resulted in the probe intermittantly shorting to ground.

TEST QTP 2191 SECTION "F" PRESSURE TEST  
TANK SERIAL NO. 0006

TEST DATE 4-21-81

PARA 4.1 PRODUCT EXAMINATION

Visual inspection and delamination (tap test) carried out, no damage found.

PARA 4.2 MOUNTING

The tank with attached pylon was set on a cradle with supports under each frame member. The cradle was positioned such that the tank article was 2<sup>0</sup> nose down, simulating the aircraft nominal ground standing attitude.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Pressure Gauge	12-22-80	6-22-81
Manometer	12-12-79	12-12-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5 FUELING

450 gallons of water @ 2<sup>0</sup> nose down

~~PARA 4.6~~ ~~POSITIVE PRESSURE TEST~~

86 P.S.I. pressure was held for 4 minutes.

PARA 4.6.1 LEAK CHECK

Visual inspection for water leakage on the tank surface showed no leakage through the laminations. All access covers leaked. Actual examination of tank while at pressure was completed by the Fiber Science representative per prior agreement.

PARA 4.7 NEGATIVE PRESSURE TEST

-10 P.S.I.G. vacuum was held for 4 minutes.

PARA 4.7.1 LEAK CHECK

No drop in vacuum

Note: Chromate tape was used during the negative pressure test on all access covers and the filler cap to check for surface leakage.

PARA 4.8 POST TEST EXAMINATION

Post test examination revealed no visible damage and no delamination.

(Reference page 10)

APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION G  
CAPACITY TEST



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF



TEST QTP SECTION "G" CAPACITY TEST  
TANK SERIAL NO. 0005

TEST DATE 4-23-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.8 Page 10 )

PARA 4.2 MOUNTING

The aircraft attachment was representative only as regards to the pylon and fuel attachments, all other parts of the system were similar only in function to the actual aircraft fueling system.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used and shown in figure 2 was accepted by both the Fiber Science and U.S.A.F. representatives.

(Reference page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Reaction Load Devices	11-3-80	11-3-81
Hydrometer	Not Applicable	
Pressure Gauges (Air)	3-12-81	9-12-81
Pressure Gauges (Fuel)	4-7-81	10-7-81
Inclinometer	4-2-81	10-21-81
Dillon Digital Readout	11-2-80	11-3-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATION CHECK

All instrumentation within calibration and fully functional.

~~PARA 4.5.1~~ ~~DRY TANK INSPECTION~~

Tank empty prior to testing.

PARA 4.5.2 TEST FLUID DENSITY

A test quantity of 500 gallons (Stoddard Solvent per P-D-680) was used with a hydrometer for density determination.

API Gravity = 47.9

Density = 6.567 lbs/gallon

PARA 4.5.3 VOID VOLUME VENT

Air was locally vented from access cap, station 159.

PARA 4.5.4 EMPTY TANK WEIGHT

Refer Fiber Science for shipping weights.

EMPTY TANK REACTION LOAD

FWD Reaction Load	132 lbs	_____
AFT Reaction Load	208 lbs	
Total Empty Weight	340 lbs.	

Note: 6 lbs attached air and fuel hoses included in 340 lbs empty weight.

PARA 4.6 TANK MAXIMUM CAPACITY

For fueling and defueling rates throughout this section

Refer to PARA 4.5.2 Page 2

COMPLETELY FULL REACTION LOADS

FWD Reaction Load	1300 lbs
AFT Reaction Load	2110 lbs
Total Tank and Fuel Weight	3410 lbs
Calculated Total Fluid Weight	3070 lbs
Calculated Total Fluid Volume	467.5 gallons

~~PARA 4.7~~ — ~~TANK SUMP CAPACITY~~

A. Low Level Float Switch Empty Signal.

Not Applicable.

B. Actual Useable Fuel Empty Tank Condition

EMPTY TANK REACTION LOADS

FWD Reaction Load	126 lbs
AFT Reaction Load	216 lbs
Total Tank and Fluid Weight	342 lbs
Calculated Sump Fluid Weight	2 lbs
Calculated Sump Fluid Volume	.30 gallons

Note: MIL-F-38363B specifies sump minimum equal to .25 percent total capacity. Minimum sump equals 1.17 gallons @ 467.5 gallons capacity.

PARA 4.8 OPERATIONAL REFUELING CAPACITY

A. High Level Float Switch Activated.

REACTION LOADS

FWD Reaction Load	1284 lbs
AFT Reaction Load	2028 lbs
Total Tank and Fluid Weight	3312 lbs
Calculated Fluid Weight	2972 lbs
Calculated Fluid Volume	452.6 gallons

B. Filler Cap Overflow Full

REACTION LOADS

FWD Reaction Load	1272 lbs
AFT Reaction Load	1984 lbs
Total Tank and Fluid Weight	3256 lbs

Calculated Fluid Weight 2916 lbs

Calculated Fluid Volume 444.04 gallons

C. Vent Line Overflow Full

REACTION LOADS

FWD Reaction Load 1298 lbs

AFT Reaction Load 2108 lbs

Total Tank and Fluid Weight 3406 lbs

Calculated Fluid Weight 3066 lbs

Calculated Fluid Volume 466.9 gallons

Note: Vent line was extended internally with tubing to increase expansion space.

ADDITIONAL DATA:

Useable fuel capacity is defined as total fueling capacity (float switch or filler cap level) minus unuseable fuel (sump). Tank sump capacity as per MIL-F-38363B is .25 percent total tank capacity = 1.17 gallons. Useable fuel capacity is therefore as follows:

Filler Cap (Reference PARA 4.8 B. page 16.)

444.04 gallons - 1.17 gallons = 442.9 gallons.

Float switch (reference PARA. 4.8.A. page 16)

452.6 gallons - 1.17 gallons = 451.4 gallons.

Note: Reaction load device readout accuracy is 1/2% full scale deflection =  $\pm$  30 lbs.

TEST QTP SECTION "G" CAPACITY TEST  
TANK SERIAL NO. 0006

TEST DATE 4-24-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.8 Page 13)

PARA 4.2 MOUNTING

The aircraft attachment was identical to that used on S/N 0005.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used was identical to the accepted and approved arrangement for S/N 0005.

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Reaction-Load Devices	11-3-80	11-3-81
Hydrometer	Not Applicable	
Pressure Gauges (Air)	3-12-81	9-12-81
Pressure Gauges (Fuel)	4-7-81	10-7-81
Inclinometer	4-2-81	10-21-81
Dillon Digital Readout	11-2-80	11-3-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5.1 DRY TANK INSPECTION

Tank empty prior to testing.

PARA 4.5.2 TEST FLUID DENSITY

A test quantity of 500 gallons Stoddard Solvent per P-D- 680 was used with a Hydrometer for density determination.

API Gravity 47.6

Density 6.578 lbs/gallon

PARA 4.5.3 VOID VOLUME VENT

Air was locally vented from access cap, station 159.

PARA 4.5.4 EMPTY TANK WEIGHT

Reference Fiber Science for shipping weights.

EMPTY TANK REACTION LOAD

FWD Reaction Load	128 lbs
-------------------	---------

AFT Reaction Load	210 lbs
-------------------	---------

Total Empty Weight	340 lbs
--------------------	---------

Note: 6 lbs attached air and fuel hoses included in 340 lbs empty weight.

PARA 4.6 TANK MAXIMUM CAPACITY

For fueling and defueling rates throughout this section, refer to PARA 4.5.2 Page 7 .

COMPLETELY FULL REACTION LOAD

FWD Reaction Load	1300 lbs
-------------------	----------

AFT Reaction Load	2118 lbs
-------------------	----------

Total Tank and Fluid Weight	3418 lbs
-----------------------------	----------

Calculated Total Fluid Weight	3078 lbs
-------------------------------	----------

Calculated Total Fluid Volume	467.92 gallons
-------------------------------	----------------

PARA 4.7 TANK SUMP CAPACITY

~~A. Low Level Float Switch Empty Signal.~~

Not Applicable.

B. Actual Useable Fuel Empty Tank Condition.

EMPTY TANK REACTION LOAD

FWD Reaction Load	128 lbs
AFT Reaction Load	214 lbs
Total Tank & Fluid Weight	342 lbs
Calculated Sump Fluid Weight	2 lbs
Calculated Sulmp Fluid Volume	.30 gallons

Note: Per MIL-F-38633B Sump minimum should be 1.17 gallons

PARA 4.8 OPERATIONAL REFUELING CAPACITY

A. High Level Float Switch Activated.

REACTION LOADS

FWD Reaction Load	1284 lbs.
AFT Reaction Load	2020 lbs
Total Tank and Fluid Weight	3304 lbs
Calculated Fluid Weight	2964 lbs
Calculated Fluid Volume	450.59 gallons

B. Filler Cap Overflow Full

REACTION LOADS

FWD Reaction Load	1274 lbs
AFT Reaction Load	1980 lbs
Total Tank and Fluid Weight	3254 lbs
Calculated Fluid Weight	2914 lbs
Calculated Fluid Volume	443.0 gallons

C. Vent line overflow fill

REACTION LOADS

FWD Reaction Load	1300 lbs
-------------------	----------

~~AFT Reaction Load~~ ~~2112 lbs~~

Total Tank and Fluid Weight 3412 lbs.

Calculated Fluid Weight 3070 lbs.

Calculated Fluid Volume 466.7 gallons

Note: Vent line was extended internally with tubing to increase expansion space.

#### ADDITIONAL DATA:

Useable fuel capacity is defined as total fueling capacity (float switch or filler cap level) minus unuseable fuel (sump).

Tank sump capacity as per MIL-F 38363B is .25 percent total tank capacity = 1.17 gallons. Useable fuel is therefore as follows:

Filler cap (Reference PARA 4.8 B. Page 20)

443.0 gallons - 1.17 gallons = 441.8 gallons

Float switch (Reference PARA 4.8 A. Page 20)

450.59 gallons - 1.17 gallons = 449.4 gallons

Note: Reaction load device readout accuracy is 1/2% F.S.D. =  $\pm$  30 lbs.

Fuel capacitance probe readings were recorded for several increments of fuel to complete test information. (See figure 4.)

FUEL CAPACITY  
GALLONS

PROBE READING  
uuf (PICO FARADS)

0 gallons

74.5 uuf

443.6 gallons

155 uuf

450.6 gallons

155 uuf

467.9 gallons

156 uuf



APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION H  
C.G. EXCURSION TEST



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE

OF

TEST QTP 2191 SERIAL "H" C.G. EXCURSION TEST  
TANK SERIAL NO. 0005

TEST DATE 4-25-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.8 Page 10)

PARA 4.2 APPROVED TEST ARRANGEMENT

The test arrangement used was accepted and approved by both  
the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.3.1 INSTRUMENTATION CALIBRATION

Reaction Load Devices	11-3-80	11-3-81
Inclinometer	4-21-81	10-21-81
Pressure Gauges (Fuel)	4-17-81	10-7-81
Pressure Gauges (Air)	3-12-81	9-12-81
Dillon Digital Readout	11-2-80	11-3-81

PARA 4.3.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration. (See Figure 1)

PARA 4.3.3 OPERATION CHECK

All instrumentation within calibration and fully functional.

PARA 4.4.1 DRY TANK INSPECTION

Tank empty prior to testing

PARA 4.4.2 TEST FLUID DENSITY

A test quantity of 500 gallons (Stoddard solvent per P-D- 680) was used with hydrometer for density determination.

API Gravity - 47.6

Density - 6.578 lbs/gallon

PARA 4.4.3 TARE WEIGHT REACTION LOADS AND G.G.

Digital readout instrumentation used had capability to zero all tare weight. No calculations using tare weight other than support attachment C.G. prior to tank mounting were needed.

Tare Weight - support beam with connecting air and fuel hoses.

TARE WEIGHT

FWD Reaction Load	272 lbs
AFT Reaction Load	322 lbs
Calculated Total Tare Weight	596 lbs
Calculated Tare C.G.	94.71 "

PARA 4.5.1 EMPTY TANK AND PYLON C.G.

EMPTY TANK REACTION LOAD WEIGHT

FWD Reaction Load	130 lbs
AFT Reaction Load	202 lbs
Calculated Total Empty Weight	334 lbs
Calculated Empty Tank C.G.	106.63"

PARA 4.5.2 FULL TANK CONDITION THROUGH TRANSFER TUBE

COMPLETELY FULL REACTION LOADS

FWD Reaction Load	1284 lbs
AFT Reaction Load	2028 lbs
Calculated Total Tank and Fluid Weight	3312 lbs
Calculated Total Tank and Fluid C.G.	107.68"
Calculated Total Fluid Weight	2972 lbs

~~PARA 4.5.3~~ ~~CENTER OF GRAVITY EXCURSION TEST~~

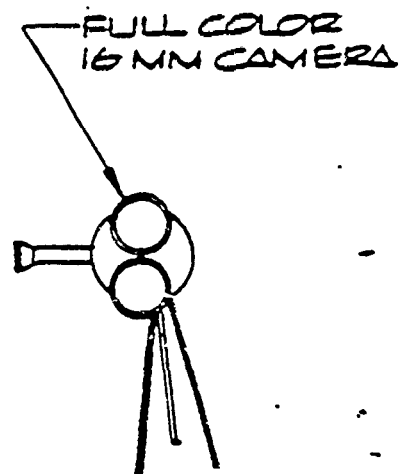
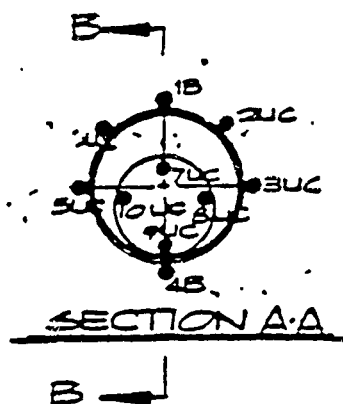
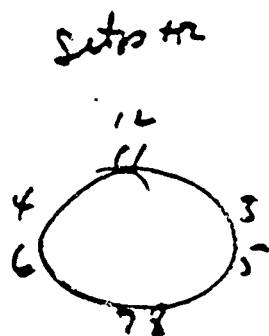
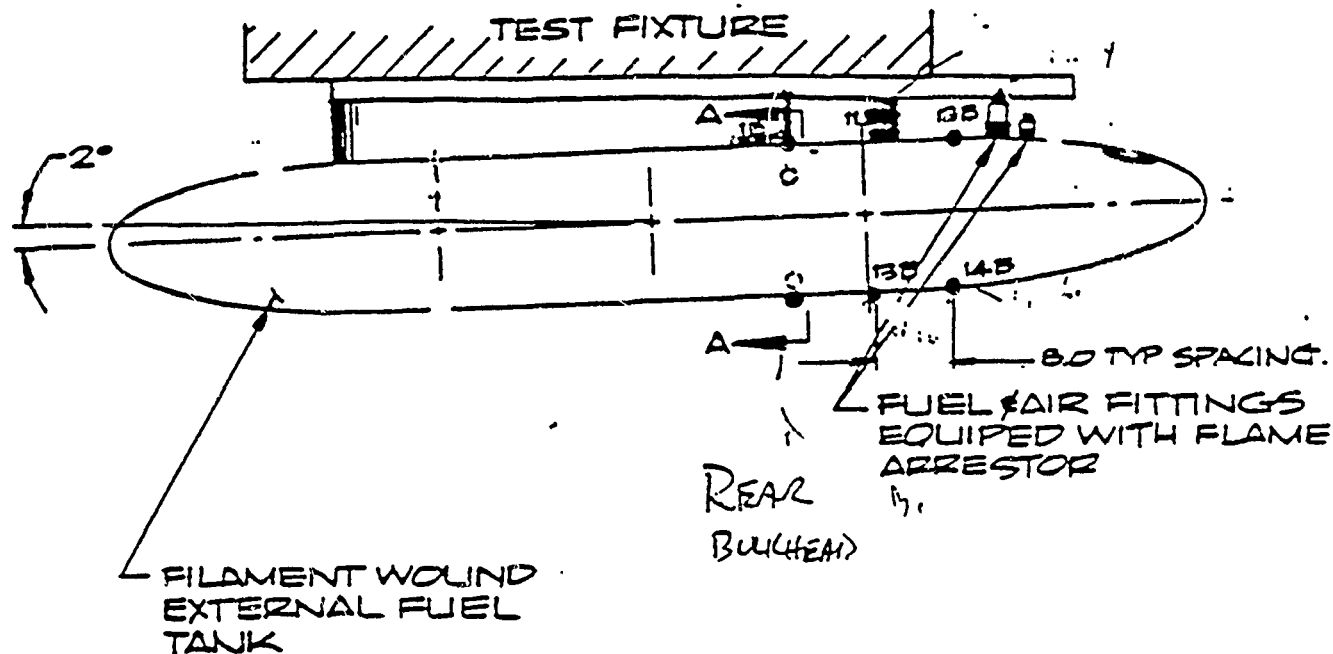
Tank fueled in 160 lb increments.

(See Figure 5)

Note: Instrumentation accuracy for reaction load devices 1/2 percent F.S.D. =  $\pm 30$  lbs

# CENTER OF GRAVITY EXCURSION LOCATION

	USABLE FUEL VOLUME	FWD. REACTION LOAD	AFT. REACTION LOAD	TOTAL REACTION LOAD	FWD. REACTION MOMENT	AFT. REACTION MOMENT	CENTER OF GRAVITY
21	466.8	1298	2108	3406	-3777.2	374591.6	108.87
20	452.6	1284	2028	3312	-3736.4	360375.6	107.68
19	414.2	1220	1840	3060	-3550.2	326968	105.69
18	389.8	1174	1726	2900	-3416.3	306710.2	104.58
17	365.2	1124	1614	2738	-3270.8	286807.8	103.56
16	340.8	1072	1506	2578	-3119.5	267616.2	102.60
15	316.4	1018	1400	2418	-2962.4	248780	101.66
14	293.0	964	1300	2264	-2805.2	231010	100.80
13	267.7	904	1194	2098	-2630.6	212173.8	99.88
12	243.3	844	1094	1938	-2456.0	194403.8	99.04
11	219.3	784	996	1780	-2281.4	176989.2	98.15
10	194.6	720	898	1618	-2095.2	159574.6	97.33
9	170.55	658	802	1460	-1914.78	142515.4	96.30
8	145.9	590	708	1298	-1716.9	125811.6	95.60
7	121.5	522	616	1138	-1519.02	109463.2	94.85
6	97.2	452	526	978	-1315.32	93470.2	94.23
5	72.5	378	438	816	-1099.98	77832.6	94.04
4	48.4	302	356	658	-878.82	63261.2	94.81
3	23.8	218	276	496	-634.38	49045.2	97.6
2	0	132	208	340	-384.12	36961.6	107.58
1	EMPTY	130	202	334	-378.5	35895.4	106.34



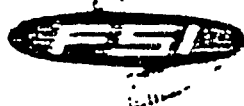
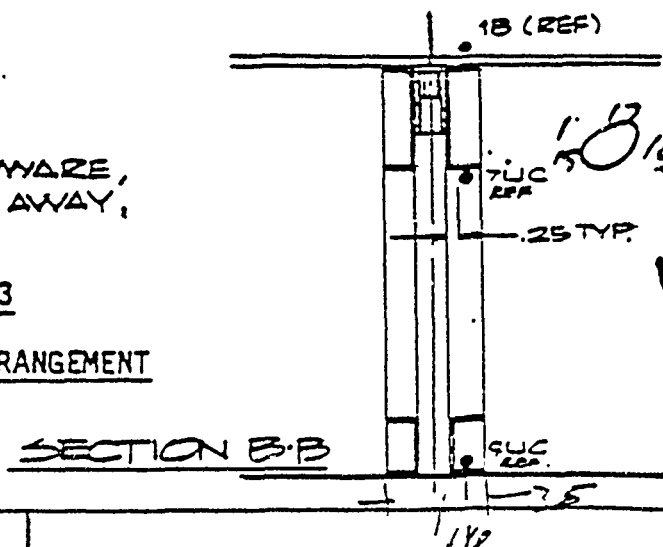
SYMBOL DEFINITIONS

B = BIAxIAL  
LIC = UNIAXIAL, CIRCUMFERENTIAL DIR.

NOTE: IF SENSORS RUN INTO HARDWARE, MOVE SENSOR MIN. DISTANCE AWAY, & RECORD NEW DIMENSION.

FIGURE 3

STRAIN SENSOR ARRANGEMENT



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTP-2191 Section "L"

DATE: 1/20/81 PAGE 8 OF 23

STRAIN GAGE DATA, FIBER SCIENCE, INC. 450 GALLON TEST TANKDATA CHANNELS IDENTIFICATION

Channel No.	Slosh Tests	100% 5-18-81	165% 6-17-81
0	1L	1L	11C
1	1C	1C	1L
2	2C	2C	1C
3	3C	6C	11L
4	4L	3C	12L
5	4C	5C	12C
6	5C	4L	6C
7	6C	4C	5C
8	1&L	11L	C
9	11C	11C	3C
10	13L	13L	4C
11	13C	13C	4L
12	12L	12L	13C
13	12C	12C	13L
14	14L	14L	7C
15	14C	14C	10C
16		7C added	8C
17		8C "	14L
18		10C "	14C
19			2L (added this test)

TEST DATA 100% May 18, 1981

018:11:48:48  
000000%LoAd

16	Q263	mV
15	Q179	mV
14	Q026	mV
13	Q143	mV
12	Q204	mV
11	Q172	mV
10	Q017	mV
9	Q129	mV
8	Q064	mV
7	Q241	mV
6	Q011	mV
5	Q014	mV
4	Q060	mV
3	Q230	mV
2	Q132	mV
1	Q569	mV
0	Q113	mV

018:11:42:19  
000075%LoAd

17	Q062	mV
16	Q421	mV
15	Q264	mV
14	Q369	mV
13	Q096	mV
12	Q546	mV
11	Q268	mV
10	Q421	mV
9	Q186	mV
8	Q135	mV
7	Q360	mV
6	Q443	mV
5	Q256	mV
4	Q237	mV
3	Q542	mV
2	Q461	mV
1	Q917	mV
0	Q010	mV

018:11:40:46  
000075%LoAd

17	Q064	mV
16	Q422	mV
15	Q270	mV
14	Q358	mV
13	Q105	mV
12	Q591	mV
11	Q273	mV
10	Q411	mV
9	Q185	mV
8	Q142	mV
7	Q371	mV
6	Q429	mV
5	Q253	mV
4	Q233	mV
3	Q528	mV
2	Q457	mV
1	Q910	mV
0	Q017	mV

018:11:28:39  
000001 25%LoAd

17	Q071	mV
16	Q139	mV
15	Q184	mV
14	Q109	mV
13	Q110	mV
12	Q295	mV
11	Q130	mV
10	Q139	mV
9	Q093	mV
8	Q096	mV
7	Q219	mV
6	Q179	mV
5	Q236	mV
4	Q106	mV
3	Q211	mV
2	Q159	mV
1	Q336	mV
0	Q102	mV

000101 100% +15PsiC

18	Q386	mV
17	Q107	mV
16	Q356	mV
15	Q818	mV
14	Q377	mV
13	Q545	mV
12	Q799	mV
11	Q758	mV
10	Q430	mV
9	Q518	mV
8	Q177	mV
7	Q569	mV
6	Q469	mV
5	Q353	mV
4	Q421	mV
3	Q785	mV
2	Q711	mV
1	Q356	mV
0	Q004	mV

18	Q379	mV
17	Q075	mV
16	Q539	mV
15	Q317	mV
14	Q486	mV
13	Q097	mV
12	Q673	mV
11	Q320	mV
10	Q546	mV
9	Q239	mV
8	Q161	mV
7	Q445	mV
6	Q562	mV
5	Q279	mV
4	Q299	mV
3	Q689	mV
2	Q602	mV
1	Q234	mV
0	Q014	mV

18	Q243	mV
17	Q067	mV
16	Q158	mV
15	Q158	mV
14	Q016	mV
13	Q113	mV
12	Q171	mV
11	Q150	mV
10	Q001	mV
9	Q087	mV
8	Q066	mV
7	Q199	mV
6	Q028	mV
5	Q111	mV
4	Q010	mV
3	Q180	mV
2	Q080	mV
1	Q301	mV
0	Q021	mV

18	Q715	mV
17	Q063	mV
16	Q273	mV
15	Q223	mV
14	Q237	mV
13	Q114	mV
12	Q433	mV
11	Q232	mV
10	Q278	mV
9	Q136	mV
8	Q118	mV
7	Q296	mV
6	Q305	mV
5	Q231	mV
4	Q162	mV
3	Q355	mV
2	Q300	mV
1	Q593	mV
0	Q047	mV



# TEST DATA 165% June 17, 1981

16	Q004	-	17	Q10	10	Q10	10
15	Q262	-	16	Q052	17	Q636	17
14	Q070	-	15	Q082	16	Q128	16
13	Q146	-	14	Q032	15	Q080	15
12	Q071	-	13	Q420	14	Q021	14
11	Q138	-	12	Q187	13	Q644	13
10	Q088	-	11	Q419	12	Q162	12
9	Q149	-	10	Q245	11	Q675	11
8	Q181	-	9	Q354	10	Q214	10
7	Q115	-	8	Q502	9	Q391	9
6	Q163	-	7	Q201	8	Q542	8
5	Q043	-	6	Q473	7	Q182	7
4	Q172	-	5	Q017	6	Q553	6
3	Q013	-	4	Q447	5	Q080	5
2	Q102	-	3	Q046	4	Q524	4
1	Q008	-	2	Q602	3	Q081	3
0	Q020	-	1	Q012	2	Q795	2
			0	Q055	1	Q105	1
					0	Q070	0

000025

17:10:13:13

000075

617:10:17:31

17	Q073	17	Q073	17	Q073	17	Q073
16	Q040	16	Q040	16	Q040	16	Q040
15	Q082	15	Q082	15	Q082	15	Q082
14	Q069	14	Q069	14	Q069	14	Q069
13	Q057	13	Q057	13	Q057	13	Q057
12	Q058	12	Q058	12	Q058	12	Q058
11	Q076	11	Q076	11	Q076	11	Q076
10	Q109	10	Q109	10	Q109	10	Q109
9	Q042	9	Q042	9	Q042	9	Q042
8	Q127	8	Q127	8	Q127	8	Q127
7	Q038	7	Q038	7	Q038	7	Q038
6	Q120	6	Q120	6	Q120	6	Q120
5	Q076	5	Q076	5	Q076	5	Q076
4	Q041	4	Q041	4	Q041	4	Q041
3	Q035	3	Q035	3	Q035	3	Q035
2	Q114	2	Q114	2	Q114	2	Q114
1	Q123	1	Q123	1	Q123	1	Q123
0	Q021	0	Q021	0	Q021	0	Q021

000000

617:10:22:13

000100

617:13:05:34

19	Q010	19	Q010	19	Q010	19	Q010
18	Q024	18	Q024	18	Q024	18	Q024
17	Q005	17	Q005	17	Q005	17	Q005
16	Q008	16	Q008	16	Q008	16	Q008
15	Q021	15	Q021	15	Q021	15	Q021
14	Q016	14	Q016	14	Q016	14	Q016
13	Q028	13	Q028	13	Q028	13	Q028
12	Q023	12	Q023	12	Q023	12	Q023
11	Q036	11	Q036	11	Q036	11	Q036
10	Q000	10	Q000	10	Q000	10	Q000
9	Q005	9	Q005	9	Q005	9	Q005
8	Q004	8	Q004	8	Q004	8	Q004
7	Q026	7	Q026	7	Q026	7	Q026
6	Q002	6	Q002	6	Q002	6	Q002
5	Q006	5	Q006	5	Q006	5	Q006
4	Q007	4	Q007	4	Q007	4	Q007
3	Q021	3	Q021	3	Q021	3	Q021
2	Q005	2	Q005	2	Q005	2	Q005
1	Q005	1	Q005	1	Q005	1	Q005
0	Q005	0	Q005	0	Q005	0	Q005

19	Q028	19	Q028	19	Q028	19	Q028
18	Q287	18	Q287	18	Q287	18	Q287
17	Q556	17	Q556	17	Q556	17	Q556
16	Q050	16	Q050	16	Q050	16	Q050
15	Q204	15	Q204	15	Q204	15	Q204
14	Q069	14	Q069	14	Q069	14	Q069
13	Q547	13	Q547	13	Q547	13	Q547
12	Q250	12	Q250	12	Q250	12	Q250
11	Q556	11	Q556	11	Q556	11	Q556
10	Q333	10	Q333	10	Q333	10	Q333
9	Q444	9	Q444	9	Q444	9	Q444
8	Q667	8	Q667	8	Q667	8	Q667
7	Q241	7	Q241	7	Q241	7	Q241
6	Q671	6	Q671	6	Q671	6	Q671
5	Q001	5	Q001	5	Q001	5	Q001
4	Q589	4	Q589	4	Q589	4	Q589
3	Q071	3	Q071	3	Q071	3	Q071
2	Q895	2	Q895	2	Q895	2	Q895
1	Q004	1	Q004	1	Q004	1	Q004
0	Q092	0	Q092	0	Q092	0	Q092

19	Q522	19	Q522	19	Q522	19	Q522
18	Q125	18	Q125	18	Q125	18	Q125
17	Q271	17	Q271	17	Q271	17	Q271
16	Q035	16	Q035	16	Q035	16	Q035
15	Q551	15	Q551	15	Q551	15	Q551
14	Q056	14	Q056	14	Q056	14	Q056
13	Q288	13	Q288	13	Q288	13	Q288
12	Q123	12	Q123	12	Q123	12	Q123
11	Q282	11	Q282	11	Q282	11	Q282
10	Q162	10	Q162	10	Q162	10	Q162
9	Q253	9	Q253	9	Q253	9	Q253
8	Q333	8	Q333	8	Q333	8	Q333
7	Q157	7	Q157	7	Q157	7	Q157
6	Q303	6	Q303	6	Q303	6	Q303
5	Q032	5	Q032	5	Q032	5	Q032
4	Q306	4	Q306	4	Q306	4	Q306
3	Q013	3	Q013	3	Q013	3	Q013
2	Q326	2	Q326	2	Q326	2	Q326
1	Q009	1	Q009	1	Q009	1	Q009
0	Q046	0	Q046	0	Q046	0	Q046

19	Q092	19	Q092	19	Q092	19	Q092
18	Q025	18	Q025	18	Q025	18	Q025
17	Q025	17	Q025	17	Q025	17	Q025
16	Q012	16	Q012	16	Q012	16	Q012
15	Q044	15	Q044	15	Q044	15	Q044
14	Q055	14	Q055	14	Q055	14	Q055
13	Q005	13	Q005	13	Q005	13	Q005
12	Q021	12	Q021	12	Q021	12	Q021
11	Q009	11	Q009	11	Q009	11	Q009
10	Q028	10	Q028	10	Q028	10	Q028
9	Q072	9	Q072	9	Q072	9	Q072
8	Q066	8	Q066	8	Q066	8	Q066
7	Q065	7	Q065	7	Q065	7	Q065
6	Q069	6	Q069	6	Q069	6	Q069
5	Q055	5	Q055	5	Q055	5	Q055
4	Q044	4	Q044	4	Q044	4	Q044
3	Q039	3	Q039	3	Q039	3	Q039
2	Q015	2	Q015	2	Q015	2	Q015
1	Q010	1	Q010	1	Q010	1	Q010
0	Q003	0	Q003	0	Q003	0	Q003

# TEST DATA 165% June 17, 1981

17	3526	mv	10	4146	mv	10	4205	mv	13	4574	mv
16	3066	mv	17	4633	mv	17	4750	mv	17	4671	mv
15	3084	mv	16	3018	mv	14	4605	mv	15	4711	mv
14	3033	mv	15	4073	mv	15	4267	mv	15	4516	mv
13	3547	mv	14	3022	mv	14	4006	mv	14	4133	mv
12	3311	mv	13	4043	mv	13	4753	mv	13	4363	mv
11	4578	mv	12	4190	mv	12	4212	mv	12	4242	mv
10	4241	mv	11	4678	mv	11	4702	mv	11	4391	mv
9	4455	mv	10	4203	mv	10	4333	mv	10	4404	mv
8	4595	mv	9	4595	mv	9	4449	mv	9	4442	mv
7	4135	mv	8	4550	mv	8	4671	mv	7	4727	mv
6	4013	mv	7	4177	mv	7	4212	mv	6	4333	mv
5	4134	mv	6	4571	mv	6	4710	mv	5	4553	mv
4	4528	mv	5	4060	mv	5	4089	mv	4	4755	mv
3	4064	mv	4	4514	mv	4	4628	mv	3	4110	mv
2	4024	mv	3	4574	mv	3	4094	mv	2	4355	mv
1	4092	mv	2	4797	mv	2	4049	mv	1	4133	mv
0	4114	mv	1	4096	mv	1	4100	mv	0	4121	mv
			0	4066	mv	0	4093	mv			

0001000  
17:13:11:12

0001000  
617:13:17:29

0001200  
617:13:20:24

0001400  
617:13:21:30

19	4559	mv	19	4002	mv	19	4384	mv	17	4070	mv
18	4731	mv	18	4035	mv	18	4160	mv	16	4247	mv
17	4541	mv	17	4012	mv	17	4690	mv	15	4814	mv
16	4033	mv	16	4043	mv	16	4011	mv	14	4332	mv
15	4074	mv	15	4023	mv	15	4210	mv	13	4112	mv
14	4063	mv	14	4004	mv	14	4010	mv	12	4807	mv
13	4551	mv	13	4023	mv	13	4704	mv	11	4252	mv
12	4548	mv	12	4023	mv	12	4183	mv	10	4635	mv
11	4533	mv	11	4037	mv	11	4733	mv	9	4337	mv
10	4513	mv	10	4002	mv	10	4254	mv	8	4418	mv
9	4601	mv	9	4013	mv	9	4423	mv	7	4665	mv
8	4026	mv	8	4002	mv	8	4616	mv	6	4278	mv
7	4130	mv	7	4026	mv	7	4192	mv	5	4061	mv
6	4610	mv	6	4017	mv	6	4641	mv	4	4391	mv
5	4303	mv	5	4004	mv	5	4084	mv	3	4696	mv
4	4609	mv	4	4006	mv	4	4577	mv	2	4102	mv
3	4076	mv	3	4026	mv	3	4083	mv	1	4230	mv
2	4474	mv	2	4027	mv	2	4914	mv	0	4123	mv
1	4105	mv	1	4053	mv	1	4106	mv			
0	4222	mv	0	4002	mv	0	4079	mv			

TEST DATA, June 17, 1981

15 3109 mV  
14 3962 mV  
13 3068 mV  
12 3006 mV  
11 3037 mV  
10 3221 mV  
9 4042 mV  
8 3016 mV  
7 3069 mV  
6 3006 mV  
5 3023 mV  
4 3002 mV  
3 3040 mV  
2 3489 mV  
1 3092 mV  
0 3010 mV

00000000  
017:11:27:16

17 3972 mV  
16 3026 mV  
15 3760 mV  
14 3215 mV  
13 3951 mV  
12 3404 mV  
11 3979 mV  
10 3516 mV  
9 3537 mV  
8 3430 mV  
7 3433 mV  
6 3120 mV  
5 3107 mV  
4 3491 mV  
3 3129 mV  
2 3737 mV  
1 3167 mV  
0 3156 mV

001679  
017:11:27:17

15 3109 mV  
14 3962 mV  
13 3068 mV  
12 3006 mV  
11 3037 mV  
10 3221 mV  
9 4042 mV  
8 3016 mV  
7 3069 mV  
6 3006 mV  
5 3023 mV  
4 3002 mV  
3 3040 mV  
2 3489 mV  
1 3092 mV  
0 3010 mV

1009  
017:11:27:18

15 3109 mV  
14 3962 mV  
13 3068 mV  
12 3006 mV  
11 3037 mV  
10 3221 mV  
9 4042 mV  
8 3016 mV  
7 3069 mV  
6 3006 mV  
5 3023 mV  
4 3002 mV  
3 3040 mV  
2 3489 mV  
1 3092 mV  
0 3010 mV

00000000  
017:11:27:19

17 3972 mV  
16 3026 mV  
15 3760 mV  
14 3215 mV  
13 3951 mV  
12 3404 mV  
11 3979 mV  
10 3516 mV  
9 3537 mV  
8 3430 mV  
7 3433 mV  
6 3120 mV  
5 3107 mV  
4 3491 mV  
3 3129 mV  
2 3737 mV  
1 3167 mV  
0 3156 mV

15 3109 mV  
14 3962 mV  
13 3068 mV  
12 3006 mV  
11 3037 mV  
10 3221 mV  
9 4042 mV  
8 3016 mV  
7 3069 mV  
6 3006 mV  
5 3023 mV  
4 3002 mV  
3 3040 mV  
2 3489 mV  
1 3092 mV  
0 3010 mV

001679  
017:11:27:20

APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION J  
SLOSH AND VIBRATION TEST



FIBER SCIENCE, INC.  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE OF

TEST QTP 2191 SECTION "J" SLOSH & VIBRATION TEST  
TEST SERIAL NO. 0005

TEST DATE 5-7-81 THRU 5-12-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.8 Page 10)

PARA 4.2 MOUNTING

The aircraft attachment was representative only as regards the pylon, all other parts of the system were similar only in function to simulate the aircraft configuration.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangment used was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Accelerometer	11-12-80	11-12-81
Timing Device	11-4-80	11-4-81
Pressure Gauge	1-16-81	7-16-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5.1 FUELING AND PRESSURIZATION

After filling with 300 gallons of water @2<sup>0</sup> nose down, 15 P.S.I.G. applied with no leakage resulting.

~~PARA 4.5.2 SLOSH & VIBRATE ABOUT ROLL AXIS~~

(Reference Pages 26A-26B for results.)

PARA 4.5.3 SLOSH & VIBRATE ABOUT PITCH AXIS

(Reference Pages 26C-26D for results.)

PARA 4.5.4 VIBRATE ABOUT PITCH AXES

(Reference Pages 26E for results.)

PARA 4.6 POST VIBRATION EXAMINATION

(Reference PARA 4.8 Page 26 )

PARA 4.7 POST VIBRATION PRESSURE TEST

After the tank was filled with 450 gallons @ 2<sup>0</sup> nose down, 112 P.S.I.G. was applied. At the end of the 3 minutes water was detected leaking from surface liminations in the vicinity of the drain plug and from the sealant used on the drain plug fitting. This was the first indication of tank shell leakage since commencing testing.

During the completion of post vibration pressure test no leakage occurred other than at the access covers and filler cap.

Note: Fuel probe not installed during pressure test.

PARA 4.8 POST SLOSH & VIBRATION EXAMINATION

No damage was visible on the skin where leakage occurred. There was no technique available to determine if the drain plug fitting or the liner was responsible for the surface leakage. Internal examination revealed fatigue failures in both baffle frames (See Figure 6)

Visual inspection and delamination (tap test) showed no damage.

## STRAIN GAUGE TEST RESULTS

For strain gauge information see Specialized Testing Service report 8174.

ARGENT-FL JUNE COMPANY

CONTRACT NO. A3648

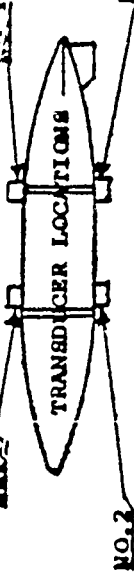
SLOSH & VIBRATION TEST LOG

SALES ORDER NO. 6794

TANK NO.

SERIAL NO. 0005

ROLL



TANK CAPACITY - FATED 450 GAL.

TANK CAPACITY - TEST 300 GAL.

TANK PRESSURE-OPERATING & TEST 15 PSIG

81	DATE	TIME	VIB. RPM	SLOSH RATE	VIB. AMPLITUDE - INCHES					INT. PRESS. PSI	(RECORD CONDITION AT EACH INSPECTION) REMARKS	INSP. NO.
					NO. 1	NO. 2	NO. 3	NO. 4	NO. 5			
5-7	10:35	1960	17	.021	.031	.019	.035			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	11:35	1960	17	.021	.031	.042	.035			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	12:35	1970	17	.021	.032	.043	.036			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	13:35	1970	17	.021	.030	.042	.036			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	14:35	1960	17	.022	.032	.044	.035			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	15:35	1960	17	.022	.032	.043	.035			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	16:35	1960	17	.022	.031	.042	.034			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	17:35	1960	17	.022	.031	.042	.034			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	18:35	1960	17	.022	.032	.042	.033			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	19:35	1960	17	.022	.032	.042	.033			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	20:35	1960	17	.023	.032	.043	.033			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	21:35	1960	17	.023	.031	.042	.034			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	22:35	1960	17	.023	.031	.042	.034			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)
5-7	23:35	1960	17	.023	.031	.042	.034			15	NO EVIDENCE OF ANY LEAKAGE	(57) (S)

CHECKED		APPROVED		TITLE	PAGE	2.5.6
				SLOSH & VIBRATION TEST	MODEL <del>XXXX</del>	
				450 GALLON FUEL TANK	REPORT NO.	
				AIRCRAFT		

Tank P/N 2191-001

By \_\_\_\_\_

Tank S/N 0005

Date 5-7-81 Time 10:35

### SLOSH/VIBRATION

Tank Capacity - Rated 450 Gal. Test 300 Gal.

Tank Pressure - Operating & Test 15 PSIG

Height of Specimen above Slosh Axis 28.0

Attitude of Tank on Slosh Table LEVEL

ECC. WT. SETTING			Slosh Rate CPM	VIBRATION MEASUREMENT /IN.					
In./Overlap		Speed RPM		At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft			Fwd.	Aft	Upper	Lower	Upper	Lower
1.50	1.50	1960	17	1.021	1.044	1.021	1.031	1.044	1.035

START OF RUN: Date 5-7-81 Time 10:35 Photo \_\_\_\_\_

LOG: NO EVIDENCE OF ANY LEAKAGE OR  
DAMAGE.

Test Engineer R. C. Hill

SFC Quality Assurance William Taylor

Government Representative \_\_\_\_\_





BARGAIN-FL... JEEP COMPANY

CONTRACT NO. A 3647

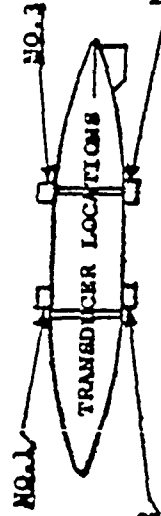
SHOCK & VIBRATION TEST LOG

SALES ORDER NO. 5722

TANK NO.

SERIAL NO. 0005

TEST NO.



TANK CAPACITY - RATED 450 GAL.

TANK CAPACITY - TEST 300 GAL.

TANK PRESSURE-OPERATING & TEST 15 PSIG

(NO. 5 HAND FIELD)

DATE	HOUR	VIB. RPM	SLC SH RATE	VIB. AMPLITUDE - INCHES					INT. PRESS PSI	(RECORD CONDITION AT EACH INSPECTION) REMARKS	INSPECTION
				NO. 1	NO. 2	NO. 3	NO. 4	NO. 5			
5-8	10:30	1700	12	.030	.036	.035	.034		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	11:30	1700	17	.032	.036	.035	.032		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	12:30	1700	17	.035	.036	.033	.032		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	13:30	1700	17	.037	.036	.033	.032		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	14:30	1700	17	.036	.035	.032	.032		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	15:30	1700	17	.036	.034	.031	.031		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	16:30	1700	17	.032	.035	.032	.032		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	17:30	1700	17	.036	.036	.032	.033		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	18:30	1700	17	.037	.036	.033	.033		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	19:30	1700	17	.036	.037	.034	.033		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	20:30	1700	17	.036	.037	.034	.033		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	21:30	1700	17	.036	.036	.033	.033		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	22:30	1700	17	.037	.036	.035	.034		15	NO EVIDENCE OF ANY LEAKAGE	(51)
5-8	23:30	1700	17	.035	.034	.035	.034		15	NO EVIDENCE OF ANY LEAKAGE	(51)

PREPARED	W. Callahan	2-15-77	SARGENT-FLETCHER COMPANY	PAGE	2	TEMP.	5.6
CHECKED			TITLE	MODEL			
APPROVED			SLOSH & VIBRATION TEST 450 <del>500</del> GALLON FUEL TANK <del>500</del> AIRCRAFT	REPORT NO.			

PITCH

Tank P/N 2191-001 Tank S/N 0005  
By \_\_\_\_\_ Date 5-8-81 Time 10:30

SLOSH/VIBRATION

Tank Capacity - Rated 450 Gal. Test 15 Gal.  
Tank Pressure - Operating & Test 15 PSIG  
Height of Specimen above Slosh Axis 28.0  
Attitude of Tank on Slosh Table LEVEL

ECC. WT. SETTING			Slosh Rate CPM	VIBRATION MEASUREMENT /IN.					
In./Overlap		Speed RPM		At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft			Fwd.	Aft	Upper	Lower	Upper	Lower
1.50	1.50	1950	17	.030	.035	.030	.036	.035	.034

START OF RUN: Date 5-8-81 Time 10:30 Photo \_\_\_\_\_

LOG: NO EVIDENCE OF ANY LEAKAGE  
OR DAMAGE.

Test Engineer [Signature]  
SFC Quality Assurance [Signature] SFC  
72  
Government Representative \_\_\_\_\_

PREPARED	NAME	DATE	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PERM.
CHECKED			TITLE SLOSH & VIBRATION TEST			
APPROVED			GALLON FUEL TANK	MODE		
			AIRCRAFT	REPORT NO.		

### VIBRATION TEST:

Tank P/N 2191-001 Tank S/N 0005  
 Fill Tank Completely: Requires 150 Gal. 450 TOTAL  
 Tank Pressure: Operating & Test 15 PSIG

P/N 2191-001

ECC. WT. SETTING			VIBRATION MEASUREMENT/IN.					
In./Overlap		Speed RPM	At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft		Fwd.	Aft	Upper	Lower	Upper	Lower
1.50	1.50	196	.035	.032	.035	.047	.032	.033

10-MINUTE RUN: Date 5-1-81 Time 9:25

LOG: \_\_\_\_\_

START 9:25  
STOP 9:35

### LEAKAGE TEST:

Tank Pressure 15 PSIG  
 Joints ✓ Doors ✓ Fittings ✓ Seams ✓  
 Other \_\_\_\_\_

Results of Tests: NO EVIDENCE OF ANY LEAKAGE.  
2 BAFFLES ONE FWD + ONE AFT PORTED  
NEAR CENTER OF TANK.

Test Engineer [Signature]

SFC Quality Assurance [Signature]



Government Representative \_\_\_\_\_

## ~~POST-VIBRATION WATER LEAKAGE DRYOUT~~

Prior to environmental chamber testing holes were drilled in the area where surface leakage had occurred. Reference PARA 4.7 (Page 26 )

The tank was left at 130-160<sup>0</sup>F for 24 hours to eliminate all water present in the honeycomb. After 160<sup>0</sup>F failed to eliminate all water the temperature was increased to 220<sup>0</sup>F under the supervision of the Fiber Science representative. At completion of 24 hours no water remained. Several small red stains were visible from the drilled holes suggesting that leakage had occurred prior to slosh and vibration testing.

TEST QTP 2191 SECTION "J" SLOSH & VIBRATION TEST  
TANK SERIAL NO. 0006

TEST DATE 4-29-81 THRU 4-31-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.8 Page 13)

PARA 4.2 MOUNTING

The aircraft attachment was identical to that used on S/N 0005.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used was identical to the accepted and approved arrangement for S/N 0005.

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Accelerometer	11-12-80	11-12-81
Timing Device	11-4-80	11-4-81
Pressure Gauge	1-16-81	7-16-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional

PARA 4.5.1 FUELING AND PRESSURIZATION

After filling with 300 gallons water @ 2<sup>0</sup> nose down, 15 P.S.I.G. applied with no leakage resulting.

PARA 4.5.2 SLOSH AND VIBRATION ABOUT PITCH AXIS

(Reference Pages 29A-29B for results.)

~~PARA 4.5.3 SLOSH AND VIBRATION ABOUT ROLL AXIS~~

(Reference pages 29C-29D for results.)

PARA 4.5.4 VIBRATE ABOUT PITCH AXIS

(Reference Pages 29E for results.)

PARA 4.6 POST VIBRATION EXAMINATION

(See PARA 4.8 Below)

PARA 4.7 POST VIBRATION PRESSURE TEST

After the tank was filled with 450 gallons @ 2<sup>0</sup> nose down, 112 P.S.I.G. was applied. No leakage occurred other than the access covers and filler cap during all post vibration tests.

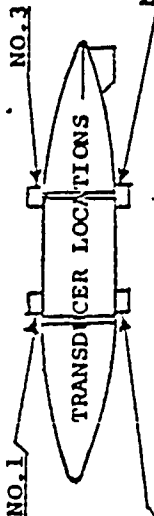
PARA 4.8 POST SLOSH AND VIBRATION EXAMINATION

The fuel probe was found to be damaged with a hole worn in the outer tube. One baffle assembly retaining bolt with washer was found on the bottom of the tank. (See Figure 6.) Visual inspection and delamination (tap test) revealed no damage and bolt origin was not determined.

SARGENT-FLETCHER COMPANY

CONTRACT NO. A3648 SLOSH & VIBRA IN TEST LOGSALES ORDER NO. 6774TANK NO. 006 2191-001

PITCH

TANK CAPACITY - RATED 450 GAL.SERIAL NO. 300 GAL.TYPE NO. NO.2 TANK PRESSURE-OPERATING & TEST 15 PSIG  
(NO. 5 HAND HELD)

81	DATE	HOUR	VIB. RPM	SLOSH RATE	VIB. AMPLITUDE - INCHES				INT. PRESS PSI	(RECORD CONDITION AT EACH INSPECTION) REMARKS	INSPECTOR
					NO.1	NO.2	NO.3	NO.4			
	4-29	15:00	1960	17	.033	.034	.032	.033	15	NO LEAKAGE STRUCTURALITY*	(89)
	4-29	16:00	1910	17	.039	.038	.032	.033	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	17:00	1910	17	.035	.040	.034	.033	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	18:00	1910	17	.036	.041	.034	.033	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	19:00	1990	17	.037	.042	.035	.034	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	20:00	1910	17	.037	.042	.034	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	21:00	1930	17	.036	.043	.034	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	22:00	1970	17	.036	.043	.034	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	23:00	1970	17	.037	.045	.034	.036	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-29	24:00	1970	17	.037	.045	.035	.036	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-30	21:00	1970	17	.037	.045	.034	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-30	22:00	1970	17	.037	.046	.033	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-30	23:00	1970	17	.036	.045	.033	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)
	4-30	23:30	1990	17	.036	.045	.033	.035	15	NO EVIDENCE OF ANY LEAKAGE	(89)

PREPARED	NAME	DATE	SARGENT-FLETCHER COMPANY	PAGE	52
CHECKED			TITLE	MODEL	
APPROVED			SLOSH & VIBRATION TEST 450 GALLON FUEL TANK AIRCRAFT	REPORT NO.	

Tank P/N 2191-001

By \_\_\_\_\_

Tank S/N 006

Date 4-29-81

Time 15:00

PITCH

SLOSH/VIBRATION

Tank Capacity - Rated 450 Gal. Test 300 Gal.

Tank Pressure - Operating & Test 15 PSIG

Height of Specimen above Slosh Axis 28.0

Attitude of Tank on Slosh Table LEVEL

ECC. WT. SETTING			Slosh Rate CPM	VIBRATION MEASUREMENT/IN.					
In./Overlap		Speed RPM		At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft			Fwd.	Aft	Upper	Lower	Upper	Lower
1.50	1.25	1960	17	1033	1032	1033	1034	1032	1033

START OF RUN: Date 4-29-81 Time 15:00 Photo \_\_\_\_\_

LOG: NO EVIDENCE OF ANY LEAKAGE OR

DAMAGE EXCEPT AS NOTED FROM FILLER CAP +

ACCESS COVER

Test Engineer \_\_\_\_\_

SFC Quality Assurance \_\_\_\_\_

Government Representative \_\_\_\_\_





LABORATORY FILE NO. 006

TEST NO. 2191-001

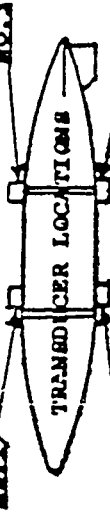
ALOSH A VIBRATION TEST LOG

SALES ORDER NO. 6794

Roll

TANK NO. 006

SERIAL NO.



TANK CAPACITY - RATED 450 GAL.

TANK CAPACITY - TEST 300 GAL.

TANK PRESSURE-OPERATING & TEST 15 PSIG

81	DATE	HOUR	VIB. RPM	SLOSH RATE	VIB. AMPLITUDE - INCHES				INT. PRESS PSI	(RECORD CONDITION AT EACH INSPECTION)	INSPECTION
					NO. 1	NO. 2	NO. 3	NO. 4			
	7-30	1330	1760	17	0.29	0.33	0.35	0.36	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	1430	1760	17	0.28	0.27	0.34	0.37	15	NO EVIDENCE OF ANY LEAKAGE	(SF) (72)
	7-30	1530	1760	17	0.27	0.32	0.35	0.36	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	1630	1760	17	0.29	0.35	0.37	0.36	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	1730	1760	17	0.29	0.34	0.37	0.36	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	1830	1760	17	0.30	0.46	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	1930	1760	17	0.30	0.47	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2030	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2130	1760	17	0.30	0.47	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2230	1760	17	0.30	0.47	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2330	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2430	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2530	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2630	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2730	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2830	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	2930	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)
	7-30	3030	1760	17	0.30	0.48	0.38	0.34	15	NO EVIDENCE OF ANY LEAKAGE	(72) (SF)

PREPARED		SARGENT-FLETCHER COMPANY	PAGE	505
CHECKED		TITLE	SLOSH & VIBRATION TEST	
APPROVED		450 GALLON FUEL TANK		MODEL
		AIRCRAFT		REPORT NO.

Tank P/N 2191-001  
By \_\_\_\_\_

Tank S/N 006  
Date 4-30-81 Time 13:30

SLOSH/VIBRATION

Tank Capacity - Rated 450 Gal. Test 300 Gal.  
Tank Pressure - Operating & Test 15 PSIG  
Height of Specimen above Slosh Axis 28.0  
Attitude of Tank on Slosh Table LEVEL

ECC. WT. SETTING			Slosh Rate CPM	VIBRATION MEASUREMENT/IN.					
In./Overlap		Speed RPM		At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft			Fwd.	Aft	Upper	Lower	Upper	Lower
1.50	1.25	1960	17	1.029	1.035	1.029	1.033	1.035	1.036

START OF RUN: Date 4-30-81 Time 15:00 Photo \_\_\_\_\_

LOG: NO EVIDENCE OF ANY LEAKAGE  
OR DAMAGE

Test Engineer \_\_\_\_\_

SFC Quality Assurance \_\_\_\_\_

Government Representative \_\_\_\_\_

SF6  
72

PREPARED	NAME	DATE	SARGENT-FLETCHER COMPANY	PAGE	5-2-4
CHECKED			TITLE SLOSH & VIBRATION TEST 450 GALLON FUEL TANK AIRCRAFT	MODE	
APPROVED				REPORT NO.	

### VIBRATION TEST:

Tank P/N 2191-001 Tank S/N 006

Fill Tank Completely: Requires 150 ADDED Gal.

Tank Pressure: Operating & Test 15 PSIG

ECC. WT. SETTING			VIBRATION MEASUREMENT/IN.					
In./Overlap		Speed RPM	At Lugs		Fwd. Blkhd.		Aft Blkhd.	
Fwd.	Aft		Fwd.	Aft	Upper	Lower	Upper	Lower
1.75	1.25	1960	.022	.028	.022	.055	.028	.070

10-MINUTE RUN: Date 5-1-81 Time 10:30

LOG: TEST START 10:30

TEST COMPLETED 10:45

### LEAKAGE TEST:

Tank Pressure 15 PSIG

Joints ✓ Doors - Fittings ✓ Seams ✓

Other \_\_\_\_\_

Results of Tests: NO EVIDENCE OF ANY LEAKAGE OR

DAMAGE

Test Engineer \_\_\_\_\_

SFC Quality Assurance \_\_\_\_\_

Government Representative \_\_\_\_\_



APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION K  
ENVIRONMENTAL TEST



*FIBER SCIENCE, INC.*  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82

PAGE OF

TEST QTP 2191 SECTION "K" ENVIRONMENTAL TEST  
TANK SERIAL NO. 0005

TEST DATE 6-1-81 THRU 6-12-81

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.6.1 Page 35 )

PARA 4.2 MOUNTING

The aircraft attachment was representative only as regards the pylon and fuel fitting, all other parts of the system were similar only in function to simulate the aircraft configuration.

PARA 4.3 APPROVED TEST ARRANGEMENT

The test arrangement used was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Brown-Honeywell Temperature  
Recorder

6-22-79

6-22-81

Pressure Gauge

Expires 10-9-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATION CHECK

All instrumentation within calibration and fully functional.

PARA 4.5 DRYING

160<sup>0</sup> maintained 24 hours with front access cover not removed.

PARA 4.6 FUELING

Fueling was completed with 450 gallons type III test fluid (per TT-S-735) containing a highly visible quantity of red staining agent.

PARA 4.7.1 LOW TEMPERATURE TESTS

Chamber Closed	0930	
Cool Down Started @	0930	
Cooling Rate	6 <sup>0</sup> /hr	
Test Temperature	-65 <sup>0</sup>	
Temperature Achieved @		
Chamber	0430	19 hrs after start
Tank	0930	48 hrs after start
Chamber Opened @	0930	72 hrs after start
Test Article Removed @	1530	
Temperature At Time Of Removal		
Tank	-20 <sup>0</sup> F	
Fuel	39 <sup>0</sup> F	

15 PSI maintained during cool down and warm up cycles.

Note: Due to the insulation quality of the composite material, extreme difficulty was encountered in gradual temperature increases or reductions. Time restraints dictated large temperature drops to achieve the desired fuel temperature.

PARA 4.7.11 LOW TEMPERATURE EXAMINATION

Brown paper was placed under the tank to detect any leakage to the floor. Upon test completion, stains were visible due to drain plug leakage. Fuel leakage had also occurred from both polar caps and from the nylon conduit fitting for the float switch. Surface cracks occurred at the joint line between the surface windings and the polar caps, station 2.0 and 217.0.

Visual inspection and delamination (tap test) revealed no liner or additional surface damage but several fuel stains were present on the tank surface.

PARA 4.7.2 HIGH TEMPERATURE TEST

Chamber Closed	1200
Warm-up Started	1200
Warm-up Rate	3.3 <sup>0</sup> F/hr.
Test Temperature	130 <sup>0</sup> F Maximum

TEMPERATURE ACHIEVED @

Chamber	1200	-24 hrs after start
Tank	0800	44 hrs after start
Chamber Opened @	1310	73 hrs after start
Test Article Removed @	1500	

TEMPERATURE AT TIME OF REMOVAL

Tank	94 <sup>0</sup> F
Fuel	126 <sup>0</sup> F

15 PSI maintained during warm-up and cool down cycles.

PARA 4.7.2.1 HIGH TEMPERATURE EXAMINATION

Highly visible red staining agent made brown paper unnecessary. Upon test completion, continued leakage was noted from the drain plug along with new fuel stains on the tank surface. (See Figure 7-10).

Inspection of the liner revealed no damage while numerous articles were found in the remaining fuel after transfer completed. The articles are listed as follows:

- 3 Rubber Strips (similar to patching material)
- 1 Drill bit
- 2 pieces transparent patching tape
- 2 pieces silicon adhesive material

Note: ~~Sm-2216~~ Adhesive used on the liner was found to be loose in large areas where proper surface preparation was not completed prior to application. A red viscous liquid was extruded which solidified during cool down. The use of non-fuel resistant adhesives during tank manufacture or repair should be investigated.

Visual inspection and delamination (tap test) revealed no damage.

Following environmental test completion, no technique was available to determine the origin of fuel leakage on the tank surface. Only a post test examination will reveal whether fuel leakage occurred through the sealant of one or several fittings, and/or the fuel liner.

Significant importance is placed on the original detection of surface leakage (reference PARA 4.7 Page 26 ) as being the possible key to the path of fuel leakage.



APPENDIX "B"  
QUALIFICATION TEST REPORT  
QTR - 2191  
SECTION L  
STATIC LOAD TEST



*FIBER SCIENCE, INC.*  
SALT LAKE CITY, UTAH

NO. QTR-2191-001

DATE: 4-6-82      PAGE      OF

TEST QTP 2191 SECTION "L" STATIC LOAD TEST  
TANK SERIAL NO. 0005

TEST DATE 5-18-81

LIMIT LOAD

PARA 4.1 PRODUCT EXAMINATION

(Reference PARA 4.7.2.1 Page 32)

PARA 4.2 MOUNTING

The aircraft attachment was representative only as regards the pylon, all other parts of the system were similar only in function to simulate the aircraft configuration

PARA 4.3 APPROVED TEST ARRANGEMENT.

The test arrangement used was accepted and approved by both the Fiber Science and U.S.A.F. representatives.

(Reference Page iii)

PARA 4.4.1 INSTRUMENTATION CALIBRATION

Pressure Gauge	1-16-81	7-16-80
Pressure Gauge-Load Maintainer	2-9-91	8-9-81

PARA 4.4.2 INSTALLATION CHECK

The tank and equipment used were installed to simulate as closely as possible the actual aircraft configuration.

PARA 4.4.3 OPERATIONAL CHECK

All instrumentation within calibration and fully functional.

PARA 4.5 FUELING

The tank was filled with 450 gallons of water at 2<sup>0</sup> nose down attitude.

PARA 4.6            STATIC STRUCTURAL LOADS

Pressure maintained @ 15 P.S.I.G.

PARA 4.6.1        LIMIT LOADS

(See structural test report, pages 1-9)

PARA 4.6.1        POST TEST EXAMINATION

Visual inspection and delamination (tap test) revealed no damage. The AFT right pylon bolt was abnormally tight and difficult to remove.

STRAIN GAUGE TEST RESULTS

For strain gauge information see Specialized Testing Service report No. 8174.

TEST QTP 2191 SECTION "L" STATIC LOAD TEST  
TANK SERIAL NO. 0005

TEST DATE 6-18-81

Ultimate and destructive loads were completed as one test with a maximum loading capability of 165% limit load.

PARA 4.6.2 ULTIMATE LOADS

(See structural test report, pages 1-10

PARA 4.6.2 POST TEST EXAMINATION

Visual examination revealed that a clearance of approximately .10 between the pylon bolt head and pylon existed. Careful examination of the bolt revealed approximately 7 threads with visible deformation, indicating that the tensile load had caused the bolt to slip. Whether this is the result of damage to the threads received during the limit load test, ultimate load test, or resulting from a defective thread insert can only be determined by the post test investigation.

During subsequent pylon removal, the AFT left pylon bolt and pylon could not be separated.

PARA 4.6.3 DESTRUCTIVE LOADS TEST

Destructive condition: Continuation to 165% limit load, condition #32.

PARA 4.6.3 DESTRUCTIVE LOADS TEST

Destructive failure would require increased loading beyond present equipment capability.

PARA 4.7 PHOTOGRAPHS

Not Applicable.

~~PARA 4.8 POST TEST EXAMINATION (Dissection)~~

The post test examination and failure evaluation is to be carried out by Fiber Science Inc. Sectioning with a subsequent detailed examination of the areas where defects occurred is recommended in order to establish the cause of failure and determine rectification.

ADDITIONAL DATA: Deformation of pylon bolt threads

NAS 149

MIL-S-8879

9/16-18 UNJF

Major Dia.

.5580

Pitch Dia.

.5247

Minor Dia.

.4950

AREA PER THREAD

$$\begin{aligned} A_{th} &= \frac{\pi}{18} \times \frac{3}{4} \left( .5247 - \frac{5}{8} \times \frac{.866025}{18} \right) \\ &= .06475 \text{ in}^2/\text{thd} \end{aligned}$$

$$F_{su} = 96000 \text{ \#/in}^2$$

MAXIMUM LOAD PER THREAD

$$P_{th} = 96000 \times .06475$$

$$= 6216 \text{ \#/thd}$$

Bolt Design Load = 31200#

No. of fully effective threads required for design load:

$$N = \frac{31200}{6216} = 5.0$$

More than 5 threads were engaged and no bolt damage should have occurred.

PREPARED	NAME B. EHLIG	DATE 6-25-81	SARGENT FLETCHER COMPANY	TEMP.	PS
CHECKED			TITLE FIBER SCIENCE	PAGE	
APPROVED				MODEL	
				QTP-2191	REPORT No.

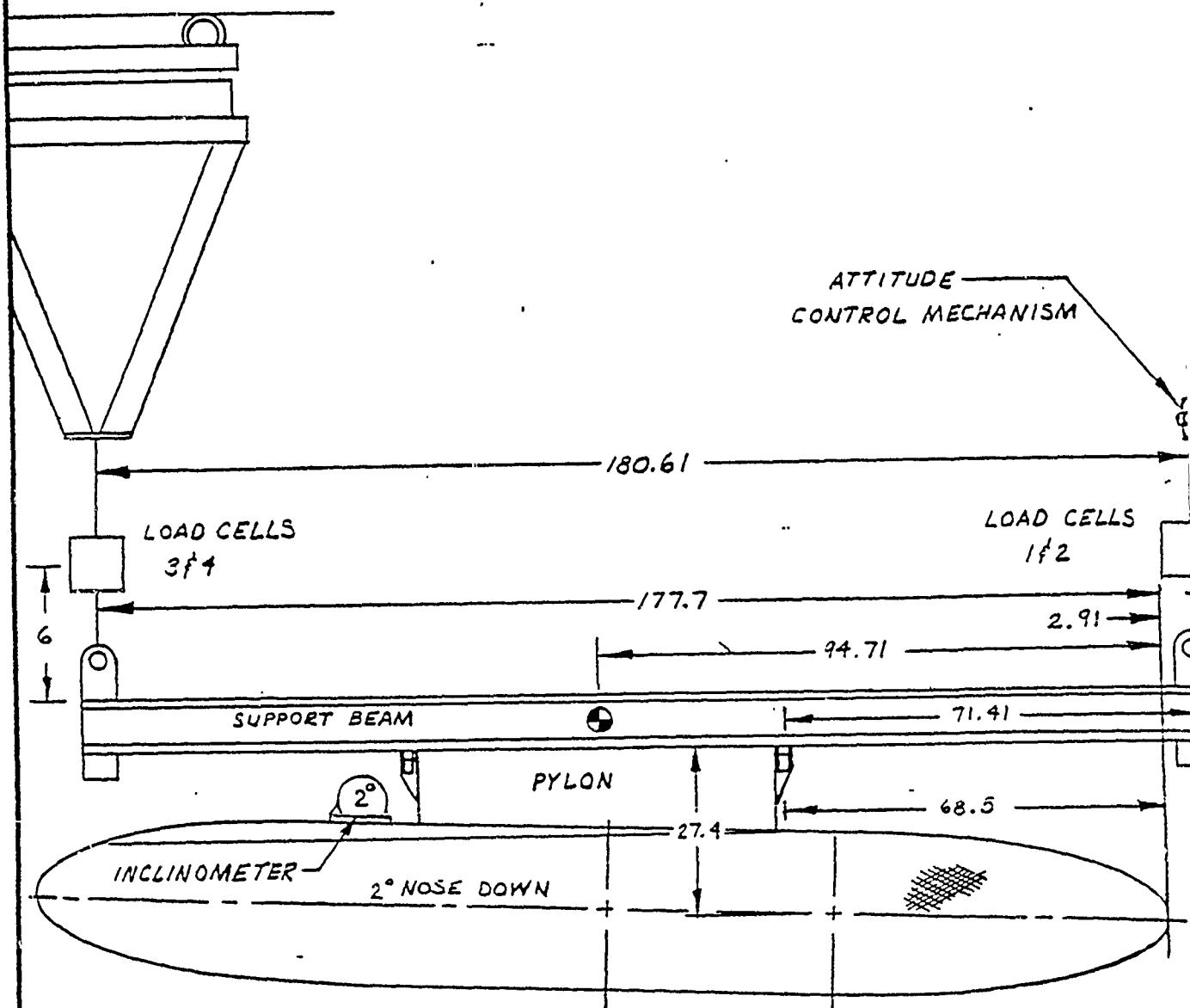


FIGURE 1

PREPARED	NAME B. EHLIG	DATE 6-25-81	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	CON.
CHECKED			TITLE FIBER SCIENCE	MODEL		
APPROVED				QTP-2191 REPORT NO.		

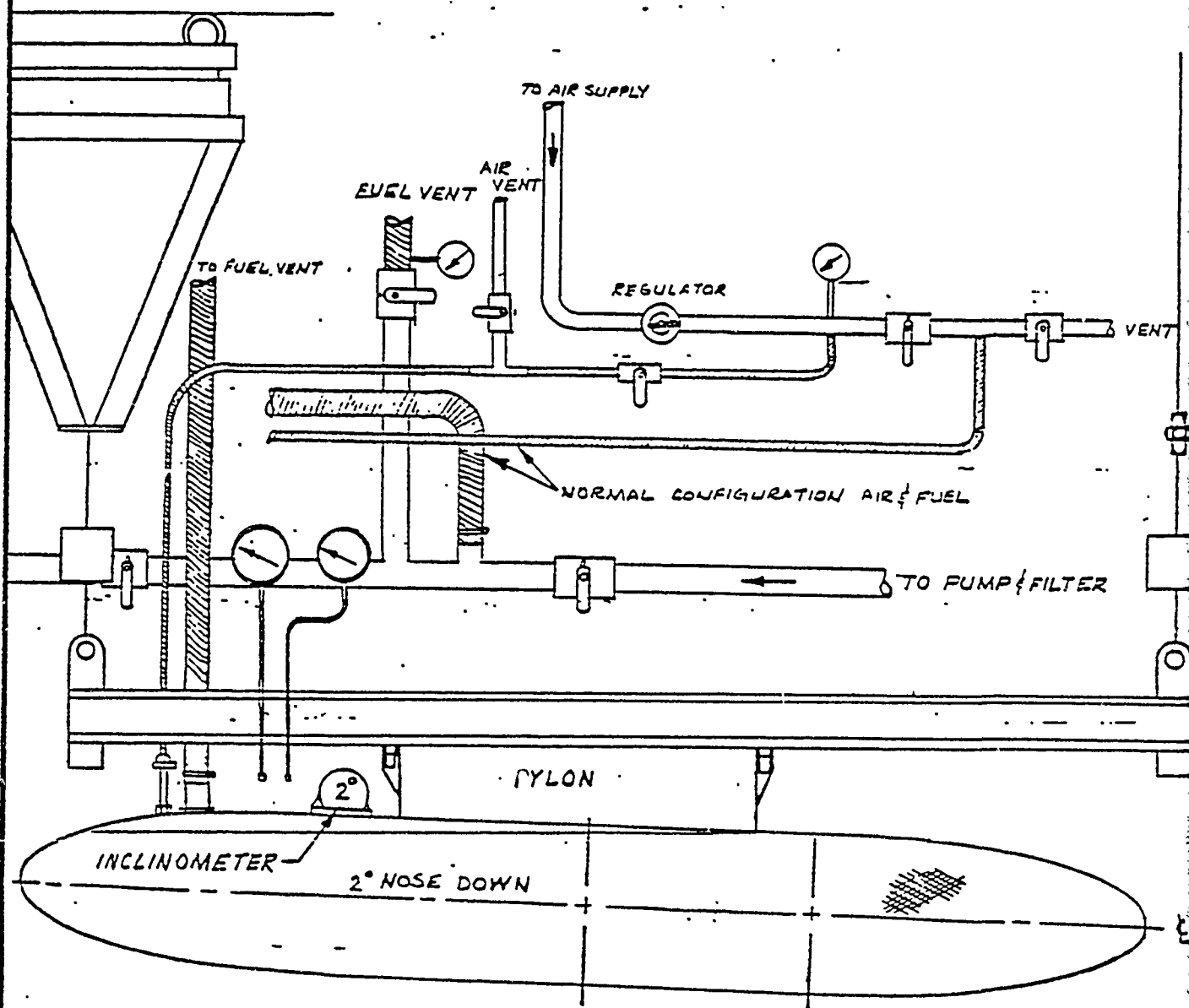
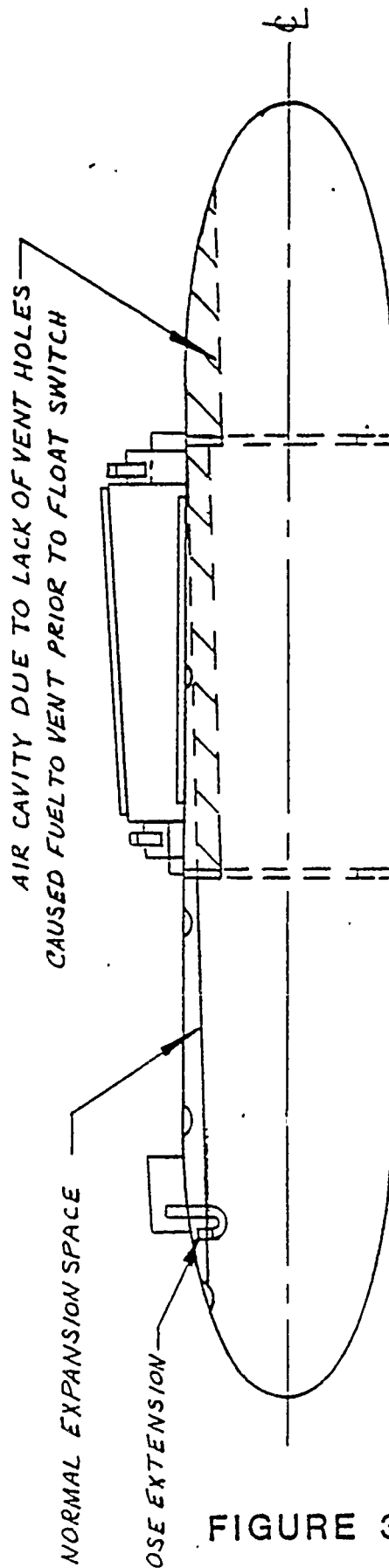


FIGURE 2

PREPARED	NAME <i>BRIAN EHLIG</i>	DATE <i>5/12/81</i>	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PER
CHECKED			TITLE <i>CAPACITY ERROR</i> <i>MISSING VENT HOLES ~ FIBER-SCIENCE</i>	MODEL		
APPROVED				REPORT No.		

S/N 005



AIR VENT HOLES WERE MISSING FROM BOTH FRAMES  
DURING INITIAL TESTING

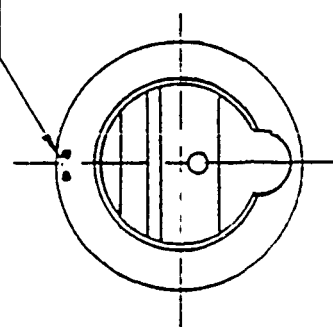
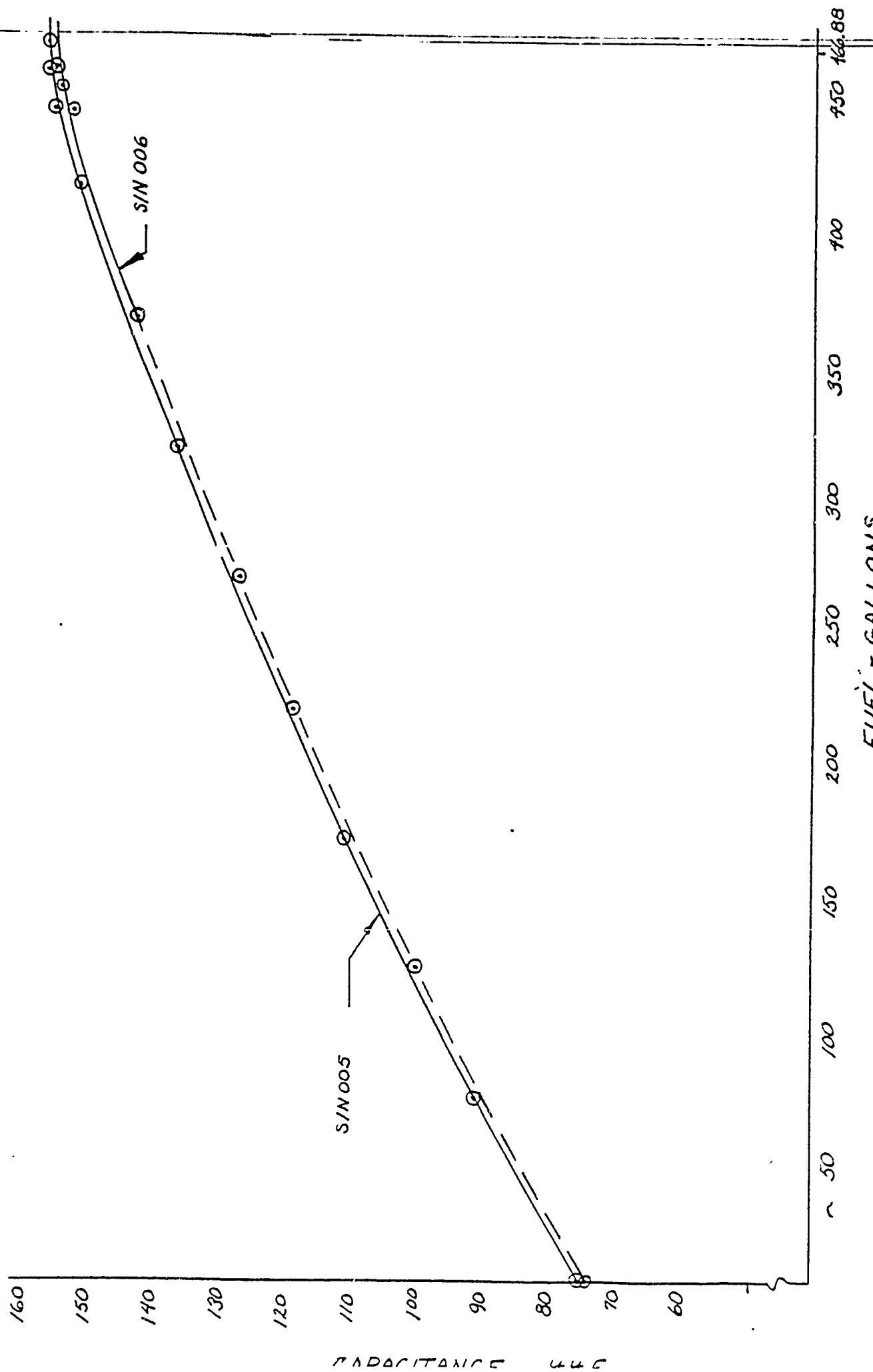


FIGURE 3



# TEST RESULTS ~ CAPACITANCE VS. GALLONS



	NAME	DATE	SARGENT-FLETCHER COMPANY	TEMP.	PR
PREPARED	BRIAN EHLIG	4-21-81		PAGE	
CHECKED			TITLE	MODEL	
			FIBER SCIENCE	QTP-2191	
APPROVED			450 GALLON TANK	REPORT NO.	

C.G. COMPARISON, S/N 005 & COMPUTER ESTIMATE

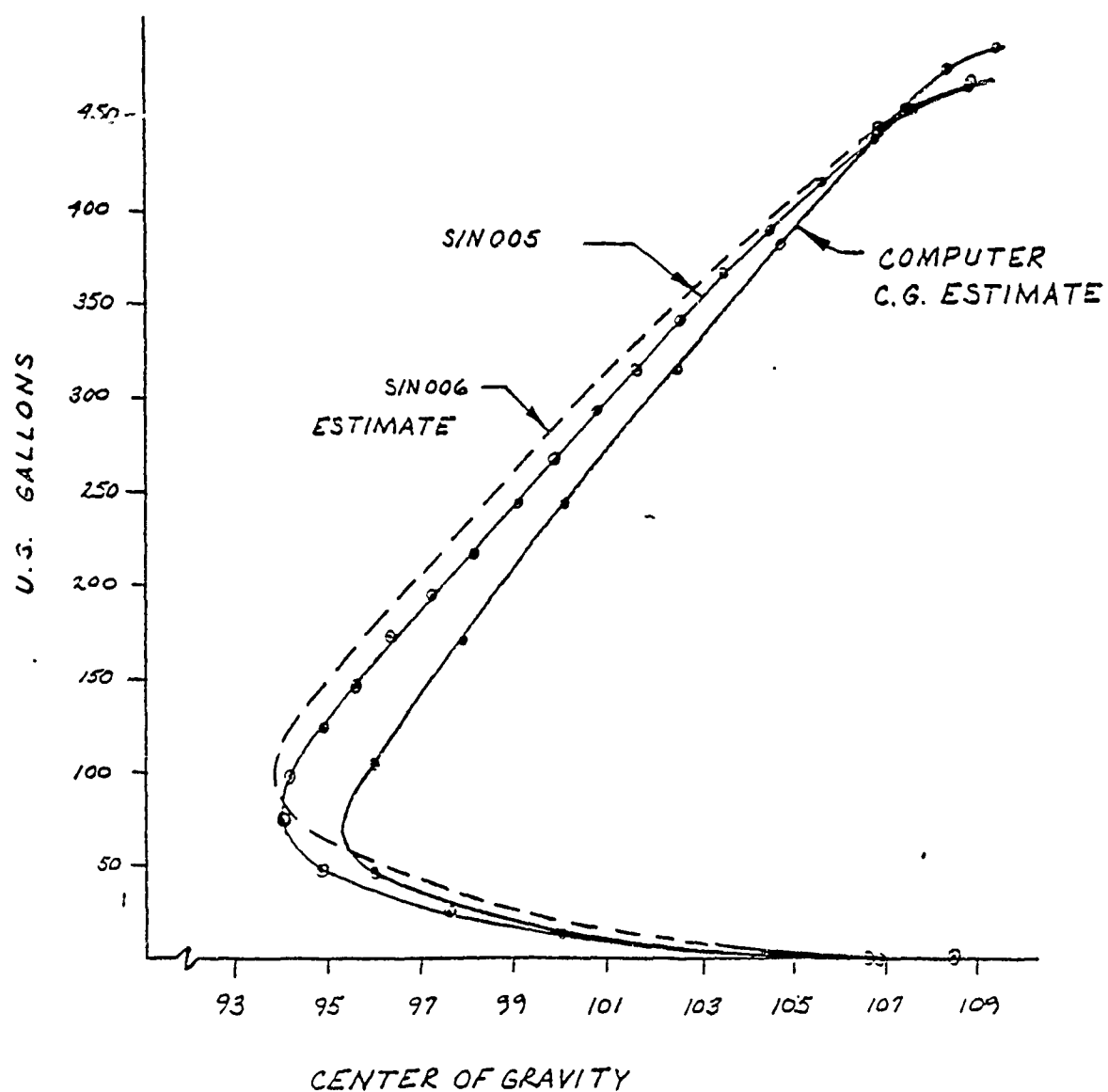
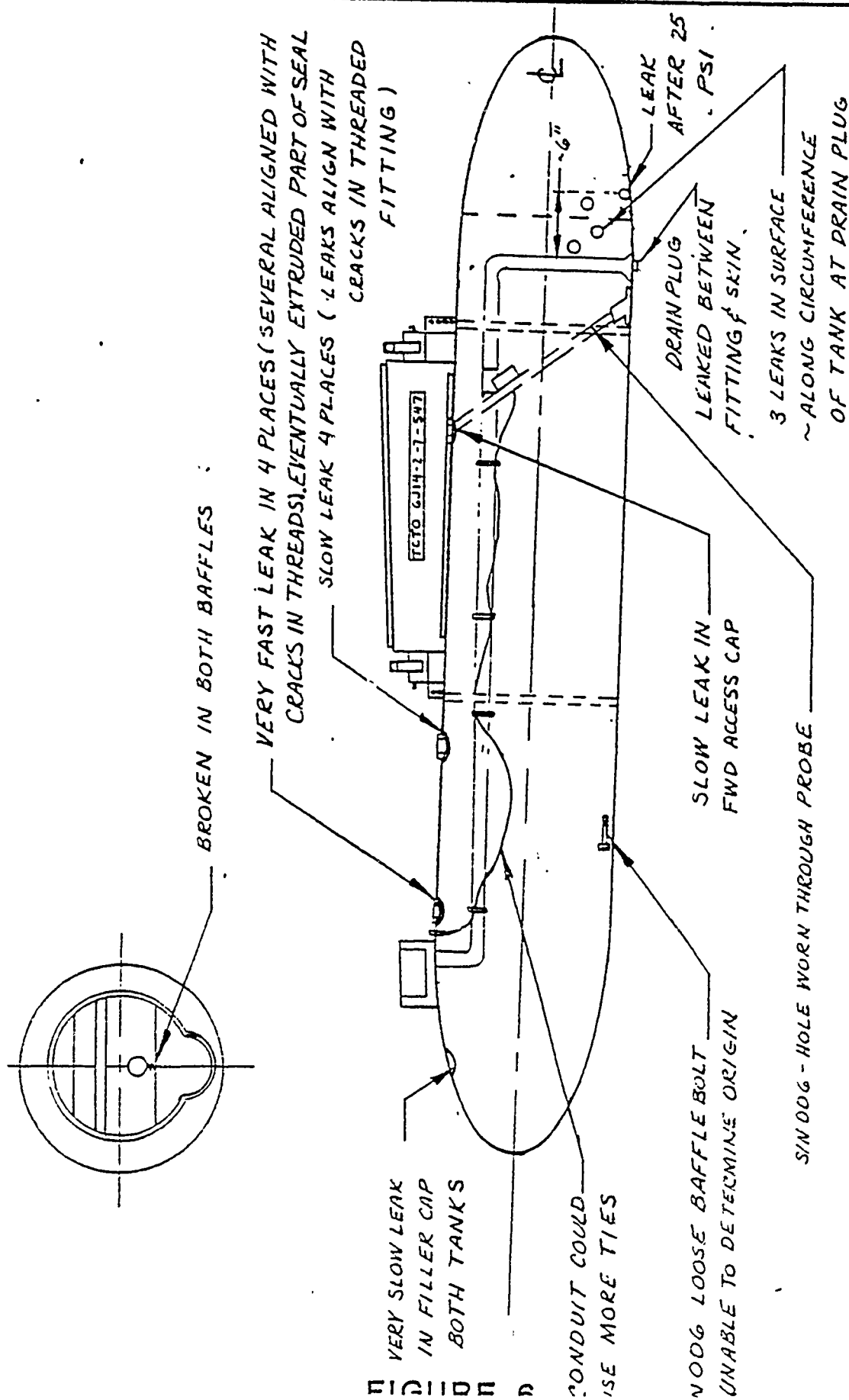


FIGURE 5

# POST VIBRATION PRESSURE TEST RESULTS

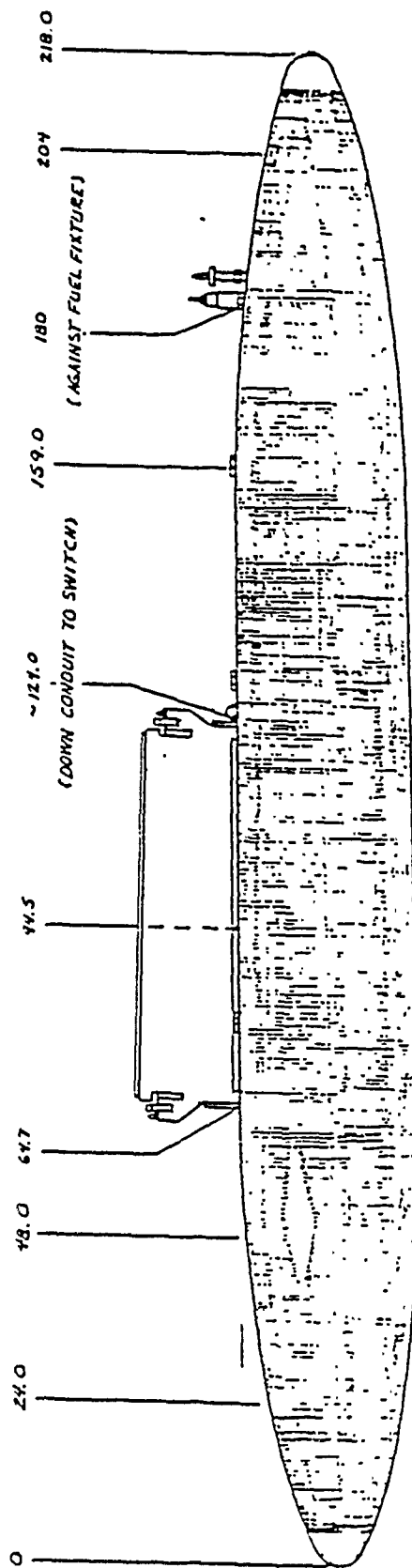
PREPARED	NAME ERIAN EHLIG	DATE 3-10-81	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PERM.
CHECKED			TITLE LEAKAGE AREAS POST VIBRATION-FIBER - SCIENCE	MODEL		
APPROVED				REPORT No.		



SIN 005 EXCEPT AS NOTED

FIBER SCIENCE 450 GALLON TANK

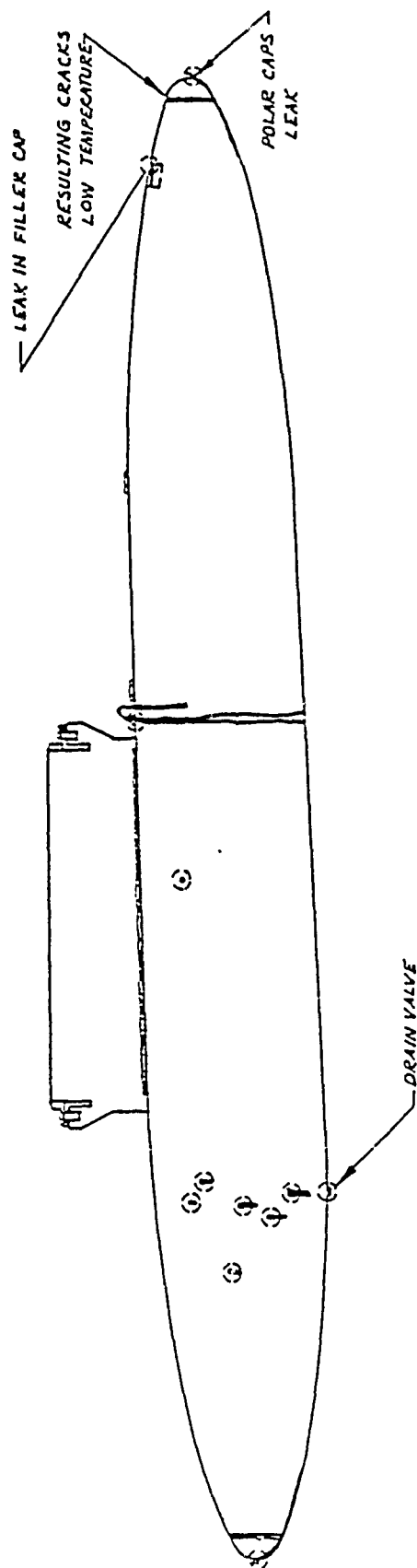
S/N 0005



### THEMOCOUPLE POSITIONS

ENVIRONMENTAL CHAMBER RESULTS

SIN 0005-1..

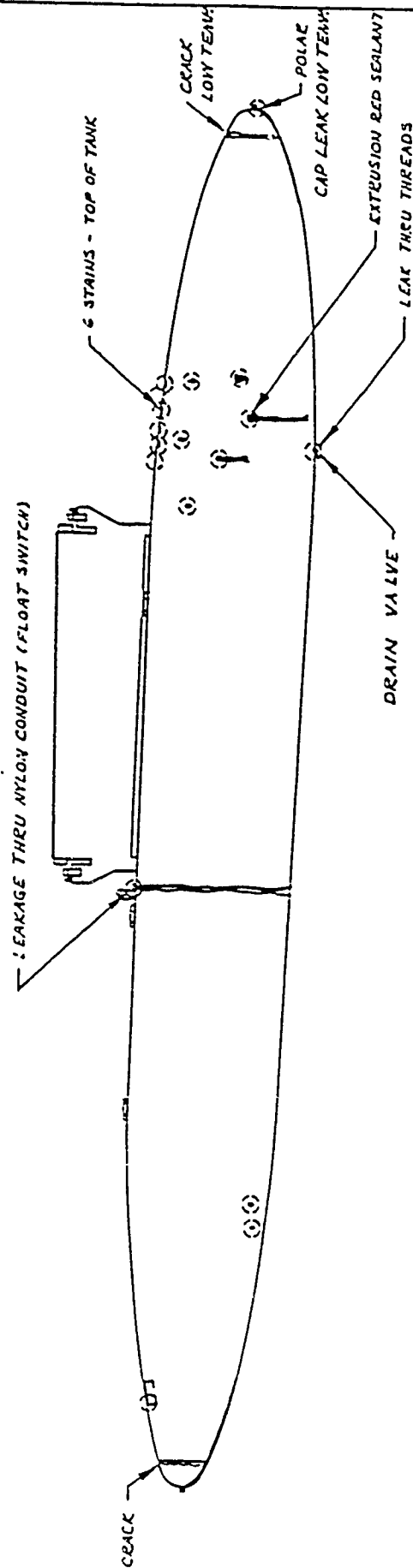


LEFT SIDE VIEW

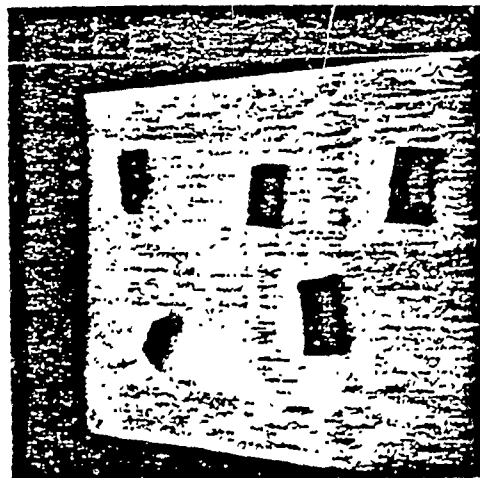
# ENVIROMENTAL CHAMBER RESULTS

S/N 0005

(X) - NOTED AREA OF LEAKAGE

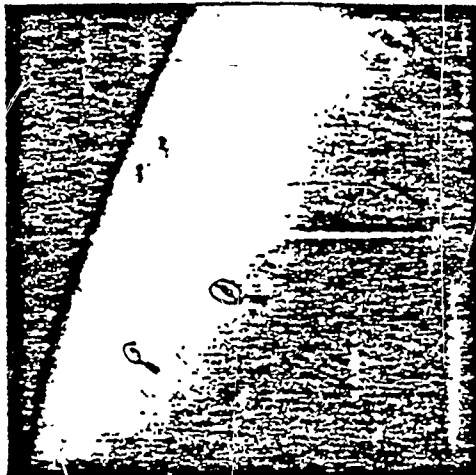


RIGHT SIDE VIEW

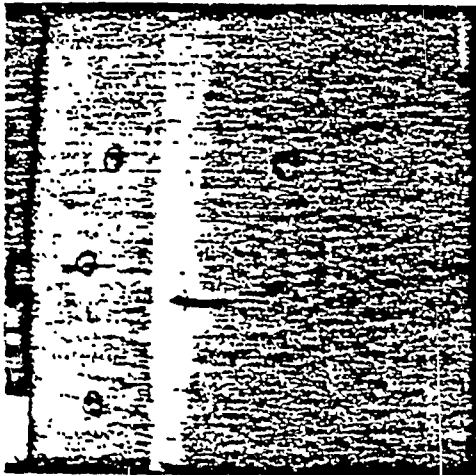


TRANSPARENT TAPE

RUBBER STRIPS



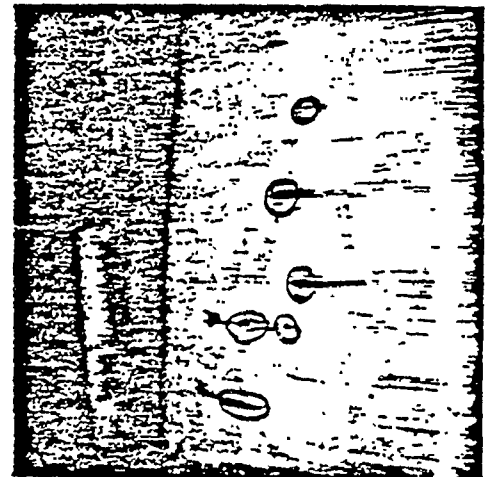
FWD LEFT SIDE



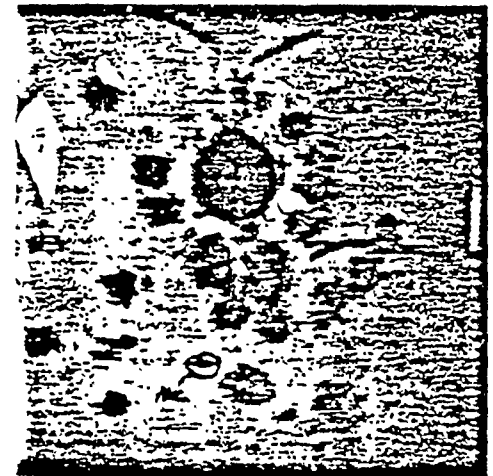
FWD RIGHT SIDE



FWD RIGHT CLOSEUP



TOP - FWD SECTION



BOTTOM DRAIN PILING

	NAME	DATE		TEMP.	PER
PREPARED	R. W. Hill	4-14-81	SARGENT-FLETCHER COMPANY	PAGE	1
CHECKED			TITLE	MODEL	
APPROVED			Fiber Science Co. Tank Struct. Test	REPORT NO.	

## Introduction

The critical loading condition for the 450 gallon Fiber Science fuel tank is in Cond. #32. The basic loads for this design condition are found on pg. 2.3-6 of this report. The max. weight of the tank plus 450 gal. of fuel is 3338\*. And this weight was distributed along the length of the tank in proportion to the calculated internal volume of the tank. Since helicopter airload are relatively light, only inertia loads from MIL-A-8591 F were used.

The loads used in this test report are on an ultimate basis ( $1.5 \times$  limit load factors), using the following sign convention:

- + Z = Upward acting.
- + Y = Acting to the left, looking forward.
- + X = Aft acting.

Moment vectors act in the same direction using the Left Hand Rule.

The tank will be tested containing 460 gal. of water as a safety measure during ultimate load application with simultaneously applied ult. internal pressure. This weight is included as part of the tare dead weight.



PREPARED	NAME <u>R. W. Hill</u>	DATE <u>4-7-81</u>	SARGENT-FLETCHER COMPANY	TEMP.	PAGE
CHECKED			TITLE <u>Fiber Science Co</u>		2
APPROVED			<u>Tank Struct. Test</u>	MODEL	
				REPORT No.	

### Structural Test Loads

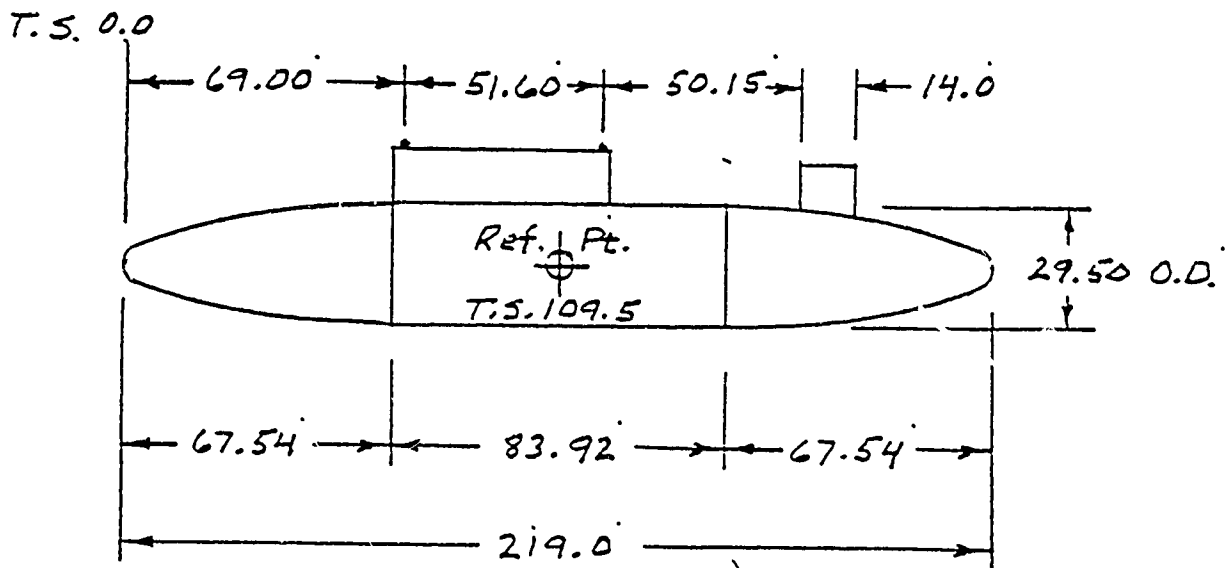


Fig. 4.2 of Sec. 4.2 "Design Criteria and Configuration" shows a total wall thickness  $t = .46"$

The total weight of tank + fuel,

$$W = 278 + 450 \times 6.8$$

$$= 3338^*$$

This weight will be distributed as tho it were a liquid entirely filling the interior of the tank. This volume consists of a cylinder 28.58" diam.  $\times$  83.92" long, plus an ellipsoid 28.58" minor diam.  $\times$  2  $\times$  67.08" total length. (The two ends)

$$V = \pi 14.29^2 \times 83.92 + \frac{4}{3} \pi \times 14.29^2 \times 67.08$$

$$= 111,215 \text{ in}^3$$

$$= 481.4 \text{ gal}$$

The assumed mass density will  $\therefore$  be

$$\delta = \frac{3338}{111,215} = .030014 \text{ #/in}^3$$

PREPARED	NAME <u>R. W. Hill</u>	DATE <u>4-7-81</u>	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PERI
CHECKED			TITLE <u>Fiber Science Co.</u>	MODEL		
APPROVED			<u>Tank Struct. Test</u>	REPORT NO.		

## Struct. Test Loads, cont.

### Nose or Tail Sect.

$$V_N = 28689 \text{ in}^3 \text{ (Prev. pg.)}$$

$$W_N = .030014 \times 28689$$

$$= 861.1 \text{ \#}$$

$$\bar{X}_N = .375 \times 67.08$$

$$= 25.155 \text{ in. from center}$$

Total ellipsoid

$$I = \frac{2 \times 861.1}{5} (67.08^2 + 14.29^2)$$

$$= 1,420,222 \text{ lb-in}^2$$

$$I_N = \frac{1,420,222}{2} - 25.155^2 \times 861.1$$

$$= 245,230 \text{ lb-in}^2$$

### Center Sect.

$$V_c = 53837 \text{ in}^3 \text{ (Prev. pg.)}$$

$$W_c = .030014 \times 53837$$

$$= 1615.8 \text{ \#}$$

$$I_c = 1615.8 (3 \times 14.29^2 + 83.92^2) / 12$$

$$= 1,030,770 \text{ lb-in}^2$$

### Total Tank

$$W = 2 \times 861.1 + 1615.8 \text{ (Above)}$$

$$= 3338 \text{ \#}$$

$$I = 1,030,770 + 2(67.12^2 \times 861.1 + 245,230)$$

$$= 9,319,900 \text{ lb-in}^2$$

### Pitching or Yawing Moment on the Tank

$$M = I_m \ddot{\theta} \text{ or } I_m \ddot{\psi}$$

$$= \frac{9,319,900 \times (\ddot{\theta} \text{ or } \ddot{\psi})}{32.174 \times 12}$$

$$= 24139 \times (\ddot{\theta} \text{ or } \ddot{\psi})$$

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CHECKED			TITLE <u>Fiber Science Co.</u>	MODEL		
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## Struct. Test Loads, cont.

### Distribution of Weight About T.S. \*109.5 (Ref. Pt.)

T.S.	X	r	A	T.S.	ΔV	W <sub>n</sub>	r <sub>n</sub>	W <sub>n</sub> r <sub>n</sub> <sup>2</sup>
0	67.08	0	0	2.5	208.3	6.22	107.0	71213
4.5	62.58	5.15	83.3	7.5	630.3	18.82	102.0	195,803
9.5	57.58	7.33	168.8	12.0	1040.0	31.06	97.5	295,264
14.5	52.58	8.87	247.2	17.0	1414.3	42.24	92.5	361,416
19.5	47.58	10.07	318.5	22.0	1753.5	52.37	87.5	400,958
24.5	42.58	11.04	382.9	27.0	2058.3	61.47	82.5	418,380
29.5	37.58	11.84	440.4	32.0	2326.3	69.47	77.5	417,254
34.5	32.58	12.49	490.1	37.0	2558.8	76.42	72.5	401,683
39.5	27.58	13.03	533.4	42.0	2756.5	82.32	67.5	375,071
44.5	22.58	13.46	569.2	47.0	2916.5	87.10	62.5	340,234
49.5	17.58	13.79	597.4	52.0	3041.8	90.84	57.5	300,340
54.5	12.58	14.04	619.3	57.0	3132.0	93.53	52.5	257,792
59.5	7.58	14.20	633.5	62.0	3185.3	95.12	47.5	214,615
64.5	2.58	14.28	640.6	67.0	3205.3	95.72	42.5	172,894
69.5		14.29	641.5	72.0	3207.5	95.79	37.5	134,705
74.5				77.0			32.5	101,178
79.5				82.0			27.5	72,441
84.5				87.0			22.5	48,494
89.5				92.0			17.5	29,336
94.5				97.0			12.5	14,967
99.5				102.0			7.5	5,388
104.5				107.0	3207.5	95.79	2.5	599
109.5		14.29	641.5					
Σ					55887.2	1669.02		4,630,025

"X" is distance from "center" of ellipsoid to T.S. 67.54

$$\text{where } \frac{X^2}{67.08^2} + \frac{r^2}{14.29^2} = 1$$

$$A = \pi r^2$$

$$\Delta V = \frac{(A_n + A_{n+1})}{2} \Delta X$$

$$W_n = \frac{3338 \times \Delta V}{2 \times 55887.2} = .029864 \Delta V$$

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## Struct. Test Loads, cont.

### Vertical Unit Loads

T.S.	$\frac{W}{n=1}$	$n$	$Wn$	$\frac{P}{M=1000}$
19.5	212.2	90.0	19098	2.0828
39.5	315.3	70.0	22071	2.4070
59.5	375.1	50.0	18755	2.0454
79.5	383.2	30.0	11496	1.2537
99.5	383.2	10.0	3832	.4179
119.5	383.2	-10.0	-3832	-.4179
139.5	383.2	-30.0	-11496	-1.2537
159.5	375.1	-50.0	-18755	-2.0454
179.5	315.3	-70.0	-22071	-2.4070
199.5	212.2	-90.0	-19098	-2.0828
	3338.0		0	0

$$\text{Where } \frac{P}{M=1000} = \frac{1000 Wn}{\sum (Wn^2)} = \frac{1000 Wn}{9,169,480}$$

### Lateral Unit Loads

T.S.	$\frac{W}{n=1}$	$n$	$Wn$	$\frac{P}{M=1000}$
29.5	358.1	80.0	28648	3.3079
49.5	353.7	60.0	21222	2.4504
69.5	382.4	40.0	15296	1.7662
89.5	383.2	20.0	7664	.8849
109.5	383.2	0	0	0
129.5	383.2	-20.0	-7664	-.8849
149.5	382.4	-40.0	-15296	-1.7662
169.5	353.7	-60.0	-21222	-2.4504
189.5	358.1	-80.0	-28648	-3.3079
	3338.0		0	0

$$\text{Where } \frac{P}{M=1000} = \frac{1000 Wn}{\sum (Wn^2)} = \frac{1000 Wn}{866,056}$$

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## Struct. Test Load, cont.

### Condition #32

$$\begin{aligned}
 n_z &= -8.659 & P_z &= -1.5 \times 19269 = -28904^* \\
 n_y &= 3.203 & P_y &= 1.5 \times 7128 = 10692^* \\
 n_x &= -2.620 & P_x &= -1.5 \times 5831 = -8746^* \\
 \ddot{\theta} &= 4.50 & M_y &= 1.5 \times 74790 = 112,180 \text{ in-lb} \\
 \ddot{\psi} &= +3.00 & M_z &= +1.5 \times 49860 = +74790 \text{ in-lb}
 \end{aligned}$$

<u>Vert. Loads</u>	①	②	③	④
T.S.	$\frac{W}{n=1}$	$\frac{P}{M=1000}$	$P_z$	
	Prev. Pg.	Prev. Pg.	-8.659 ② +112.18 ③	
19.5	212.2	2.0828	-1604	
39.5	315.3	2.4070	-2460	
59.5	375.1	2.0454	-3019	
79.5	383.2	1.2537	-3177	
99.5	383.2	.4179	-3271	
119.5	383.2	-.4179	-3366	
139.5	383.2	-1.2537	-3459	
159.5	375.1	-2.0454	-3476	
179.5	315.3	-2.4070	-3000	
199.5	212.2	-2.0828	-2072	

<u>Hor. Loads</u>	$\frac{W}{n=1}$	$\frac{P}{M=1000}$	$P_y$
T.S.	Prev. Pg.	Prev. Pg.	3.203 ② -74.79 ③
29.5	358.1	3.3079	900
49.5	353.7	2.4504	950
69.5	382.4	1.7662	1092
89.5	383.2	.8849	1161
109.5	383.2	0	1227
129.5	383.2	-.8849	1294
149.5	382.4	-1.7662	1358
169.5	353.7	-2.4504	1316
189.5	358.1	-3.3079	1394

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### WHIFFLE-TREE LOADING

Load Condition No. 32.

Reference Diagram Pages \_\_\_\_\_

### VERTICAL LOADS

Sta.	Ult. Ld.	Dead Wt.	Tare	Net Ld.	Comb.	Sta.	Comb.	Sta.
19.5	-1604	260.9	15.0	-1328	-3385	31.45	② -8619	54.80
39.5	-2460	387.7		-2057				
59.5	-3019	461.2		-2543	-5234	69.78		
79.5	-3177	471.1		-2691				
99.5	-3271	471.1		-2785	-5665	109.67	③	
119.5	-3366	471.1		-2880				
139.5	-3459	471.1		-2973	-5973	149.54		
159.5	-3476	461.2		-3000				
179.5	-3000	387.7	Y	-2597	-4393	187.68	⑤	
199.5	-2072	260.9	15.0	-1796				
	-29904	4104	150	-24650	24650			

### HORIZONTAL LOADS

	Sta.	Ult. Ld.	Comb.	Sta.	Comb.	Sta.
	29.5	900	1850	39.77	⑥	
	49.5	950				
	69.5	1092	2253	79.81	⑦	
	89.5	1161				
	109.5	1227	2521	119.77	⑧	
	129.5	1294				
	149.5	1358	2674	159.34	⑨	
	169.5	1316				
	189.5	1394	⑩			
		10992				
<u>Drag Load</u>	±	-8746	⑪			



PREPARED	NAME <u>R. W. Hill</u>	DATE <u>4-14-81</u>	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PI
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APPROVED			<u>450 Gal. Tank Test</u>	REPORT No.		

LOAD CONDITION NO. 32 (Lim. Id. only) TEST DATE 5/18/81

REFERENCE DIAGRAM PAGES

Test article to contain 460 gal. of water.

GAGE NO.	JACK AREA	PRESSURE GAGE READINGS IN PERCENT OF LIMIT LOAD									
		0	25	50	75	100	0	125	150	0	
1	8.642	0	169	337	506	675	0	843	1012	0	
2	2.795	0	12	318	624	930	0	1236	1542	0	
3	2.795	0	24	222	420	617	0	815	1013	0	
4	2.795	0	35	242	448	655	0	862	1069	0	
5	2.795	0	60	362	664	967	0	1270	1572	0	
6	2.795	0	110	221	331	441	0	552	662	0	
7	2.795	0	134	269	403	537	0	672	806	0	
8	2.795	0	150	301	451	601	0	752	902	0	
9	2.795	0	160	319	478	638	0	798	957	0	
10	.7977	0	291	583	874	1165	0	1457	1748	0	
PRESSURE		0	0	0	0	0/15	0	0	0/22.5	0	

TANK STATION	VERTICAL DEFLECTION READING IN INCHES							
0	0	.01	.08/04	.14	.16	.08		
108	0	-.01	-.04/02	-.08	-.22	-.05		
219	0	-.12	-.34/09	-.53	-.71	-.18		
			*					

\* Number under slash is permanent set at 50% of limit load

TANK STATION	HORIZONTAL DEFLECTION READING IN INCHES							
36	0	.01	.31/12	.48	.61	.36		
96	0	.11	.42/24	.75	.96	.53		
183	0	.20	.46/28	.84	1.14	.32		
			*					

ENGINEERING

R. W. Hill 5/18

QUALITY CONTROL

Fiber Science Co. 5/15/81

CUSTOMER

Jim. Sunstaker 5-15-81



PREPARED	NAME <u>R.W. Hill</u>	DATE <u>4-14-81</u>	SARGENT-FLETCHER COMPANY	PAGE	TEMP.	PC
CHECKED			TITLE <u>-Fiber Science Co.</u>	MODEL		
APPROVED			<u>450 Gal. Tank Test</u>	REPORT No.		

LOAD CONDITION NO. 32 (to 41t.) TEST DATE 6/17/81

REFERENCE DIAGRAM PAGES \_\_\_\_\_

Test article to contain 460 gallons of water.

GAGE NO.	JACK AREA	PRESSURE GAGE READINGS IN PERCENT OF LIMIT LOAD									
		0	25	50	75	100	0	125	150	0	
1	8.642	0	169	337	506	675	0	843	1012	0	
2	2x2.795	0	12	318	624	930	0	1236	1542	0	
3	2x2.795	0	24	222	420	617	0	815	1013	0	
4	2x2.795	0	35	242	448	655	0	862	1069	0	
5	2.795	0	60	362	664	967	0	1270	1572	0	
6	2.795	0	110	221	331	441	0	552	662	0	
7	2.795	0	134	269	403	537	0	672	806	0	
8	2.795	0	150	301	451	601	0	752	902	0	
9	2.795	0	160	319	478	638	0	798	957	0	
10	.7977	0	291	583	874	1165	0	1457	1748	0	
PRESSURE		0	0	0	0	0	0	0	0/21.5	0	

TANK STATION	VERTICAL DEFLECTION READING IN INCHES					
0	0				+ .10	+ .02
108	0				- .07	- .04
219	0				- .57	- .06

TANK STATION	HORIZONTAL DEFLECTION READING IN INCHES					
36	0				.425	.070
Test fixt. 91	0				.001	.000
Pylon, T.S. 91	0				.098	.004
183	0				1.023	.038

Test discontinued at 165% of limit load.

ENGINEERING

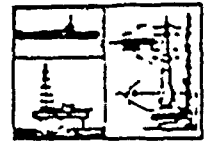
R.W. Hill 6/17/81

QUALITY CONTROL

Wm. J. Baker 6/17/81

CUSTOMER

Jim. Gumbaker 6-17-81



## **SPECIALIZED TESTING SERVICE**

*Static and Dynamic Testing*

10758 BURBANK BOULEVARD • NORTH HOLLYWOOD, CALIFORNIA 91601 • (213) 877-7317

REPORT NUMBER 8174

### STRAIN GAGE DATA, FIBER SCIENCE, INC. 450 GALLON TANK TEST

For  
Sargent - Fletcher Company  
9400 E. Flair Drive  
El Monte, CA. 91731

By  
Specialized Testing Service  
10758 Burbank Boulevard  
N. Hollywood, CA. 91601

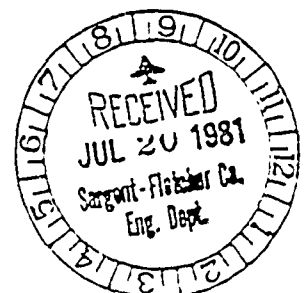
Static Test Dates: May 18, 1981, June 17, 1981

Report Date: July 17, 1981

Reported By: Sanford Friezner  
Sanford Friezner, President  
SPECIALIZED TESTING SERVICE

Purchase Order No. 07104

Reference: Revised quotation dated 2 May 1981



STRAIN GAGE DATA, FIBER SCIENCE, INC. 450 GALLON TANK TESTDATA ACQUISITION:

All strain gages (350 Ohm .125") were wired into two ten channel BLH type 225 bridge balance units. Strain gage power was supplied by two (2) SRC model 3564 power supplies. The output from the input conditioning unit was fed into a Fluke Data Logger model 22408. Strain gage bridge voltage was set to yield a digital output of 1 micro volt equal to 1 micro inch/inch of strain. The data logger printed out all data including date, time and event. At each data point 5 to 10 seconds were required to print out all data.

Note: A low bridge voltage was used (2 VDC) to keep the strain gages did not self heat while cemented on this composite material.

DATA REDUCTION:

Differences from the initial zero reading and the test point and strain change due to internal pressure (@ 100% and 150% load points) were converted to stress as follows.

Uniaxial gages: 2C,3C,5C,6C,7C,8C, and 10C

$$\text{Stress (psi)} = \text{Strain} \times E \text{ (for material gage is attached)}$$

Biaxial gages: 1B,2B,4B,11B,12B,13B, and 14B

$$\text{Long. Stress (psi)} = \frac{E(\text{long})}{(1-u^2(\text{long}))} \times (\text{Strain}_l + u_l \text{Strain}_{\text{circ.}})$$

$$\text{Circ. Stress (psi)} = \frac{E(\text{circ})}{(1-u^2(\text{circ}))} \times (\text{Strain}_c + u_c \text{Strain}_{\text{long}})$$

Outside skin reference material properties 450 outside skin.

E long. =  $6.18 \times 10^6$  psi Poissons ratio  $u = .324$

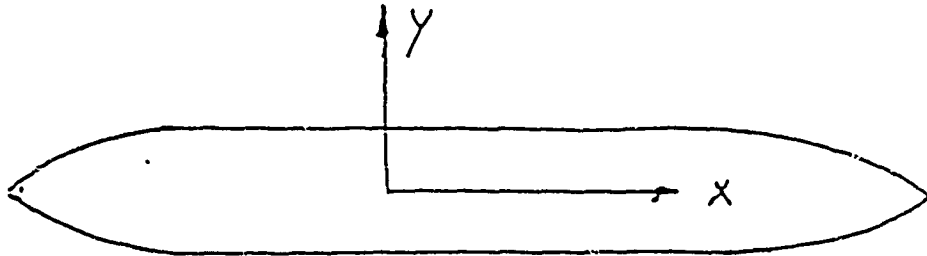
E circ. =  $3.44 \times 10^6$  " " "  $u = .181$

Aluminum rings

E<sub>y</sub> =  $10 \times 10^6$  sps " "  $u = .3$

# Material Properties

450 - outside skin



$$E_x = 6.18 \times 10^6 \quad (\text{Axial})$$

$$\mu_{xy} = .324$$

$$E_y = 3.44 \times 10^6 \quad (\text{Hoop})$$

$$\mu_{yx} = .181$$

Ref SR-2191-01 Table 3.2 Page 3.8

ENGR.	<i>Rto</i>	7/3/8	REVISED	DATE	
CHECK					
APR					
APR					

STRAIN GAGE DATA, FIBER SCIENCE, INC. 450 GALLON TANK TESTRESULTS:TEST STRESSES (PSI)TABLE #1

Test Pt.	*100%	+15psig	100%	+15psig	150%	22 psig	165%
Gage Loc.							
1C	2432	374	2916	281	5923	486	6262
1L	2170	352	2549	177	5208	468	5356
2C	1673	375	2547	337	4144	572	4111
2L			7712	602	10614	854	10906
3UC	1278	420	1307	310	2085	495	1827
4C	1190	501	730	405	1341	518	1195
L	-2831	919	-3201	788	-4545	1138	-6652
5UC	1043	255	616	58	1245	117	1283
6UC	1634	330	2095	224	3763	316	3915
7UC	2760	170	221	126	2268	420	2657
8UC	-280	320	372	-704	- 11	-368	357
10UC	11050	70	12275	63	17504	-53	19446
11C	454	1003	217	537	581	752	635
11L	915	734	858	306	1308	2104	1420
12C	138	1676	171	1417	265	2115	389
12L	3133	1871	3670	1444	6043	2104	6218
13C	164	1634	469	1433	692	2076	839
13L	-3554	1779	-3267	1506	-4862	2157	-5693
14C	165	1854	530	2085	611	3049	796
14L	-3222	1872	-3437	1929	-5154	2789	-5974

Note: \* Initial test May 18, 1981

SLOSH & VIBRATION STRESSES, MAXIMUM:

PITCH: 1L 705 psi, 12L 655 psi

ROLL: 5C 530 psi, 3C 340 psi, 6C 217 psi